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skin diver

Volume Thirty Number Four

DIVER EDUCATION	8	FREEDOM UNDER THE SEA	BILL BARADA	Keep sport diving free of excessive regulation		
ADVENTURE	18	ANATOMY OF A SHARK BITE	HOWARD HALL	An occupational hazard for those who film sharks		
PHOTOGRAPHY	24	EYE CONTACT	JIM AND CATHY CHURCH	Your subject's eyes are important in photo composition		
DIVE EQUIPMENT	33	INFLATABLE BOAT ROUNDUP	ERIC HANAUER	A diver's look at these excellent craft		
	46	HENDERSON AQUATICS	GERI MURPHY	A company president test dives his own products		
COMMERCIAL DIVING	45	DIVER'S ACADEMY OF THE EASTERN SEABOARD	BILL GLEASON	Commercial diver training in a working environment		
LOCAL DIVING	49	FLORIDA KEYS	RICK FREHSEE	Diving America's true coral reefs		
FOREIGN TRAVEL	66	THE BUCCANEER	GERI MURPHY	St. Croix's resort for the discerning diver		
DEPARTMENTS	6	DIVER'S CALENDAR	16	RX FOR DIVERS	80	NEW GEAR
	14	FILM FESTIVALS	48	TECHNIFACTS	89	SCUBA QUIZ
		AND SYMPOSIUMS	65	TRAVEL PAGE	104	DIVER'S DIRECTORY

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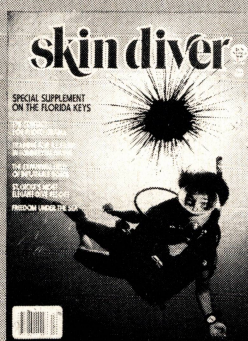
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COVER

Jim Church photographed Cathy Church in Grand Cayman using a Nikon F, 16mm fisheye lens, in an Ikelite SLR Case, Substrobe 150 Strobe. The urchin is only inches from the dome port, Cathy is three feet away.



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SDM Editorial

BY THE PUBLISHER

CHARTING A SAFER COURSE FOR DIVING



Diving is getting safer! That is the underlying message of a recently published report by the University of Rhode Island's National Underwater Accident Data Center. This latest study spans a period of nine years from 1970 to 1978, and shows a distinct reverse in the number of fatal dive accidents among sport divers in America.

On page six of this 40 page, fact-filled study, the annual fatality figures for sport divers run as follows:

1970 —	110 divers
1971 —	112 divers
1972 —	119 divers
1973 —	125 divers
1974 —	144 divers
1975 —	131 divers
1976 —	147 divers
1977 —	102 divers
1978 —	116 divers

According to this statistical report the number of fatal dive accidents was on a steady increase until 1976, when the accident curve peaked and started downward. The latest year to be measured (1978) shows that sport diving safety is back to pre-1972 figures.

This latest report is indeed good news for the dive industry: It has greatly relieved the worries and anxieties of this country's diving leaders. Spiraling accident statistics during the first half of the 1970's caused increasing pressure from both the news media and politicians intent on saddling sport diving with restrictive legislation. With the hounds of bureaucracy scratching and snarling at diving's doorstep, many leaders within the industry felt the sport might be doomed by legislative regulations and red tape. No wonder U.R.I.'s latest report is greeted with cheers and relief.

The big question now is *why* have the dive accident statistics begun to recede like the outgoing tide? What exactly are we doing right? What specifically turned the dive accidents on a downward trend? Needless to say, this will be a difficult question to answer and may remain an unsolved mystery for several years to come. There are of course a number of theories, each with its own group of enthusiastic supporters.

Some mathematicians might say that the sport of diving has merely leveled off to its own line of statistical normalcy. In other words the numbers have stabilized and the sport is merely experiencing the usual cycle of peaks and valleys found in any statistical study. The annual number of sport diving accidents could very possibly continue to fluctuate between 100 and 150 year after year. The statistician's conclusion would be that divers could probably do very little to significantly change or improve these annual statistics, because they are related directly to the base number of people actively engaged in sport diving across the U.S.

Some analysts might point toward the booming dive travel business as a cause for fewer accidents. Over the last five years there has indeed been a mass migration of sport divers from the northern regions of the U.S. to the tropical waters of resort islands.

Today, more divers are spending more of their dive time among the islands of the Caribbean, Bahamas, Mexico and the Pacific. This geographical transfer of diving activity to a much more gentle underwater environment could have an impact on diving fatalities. There is no question that dive conditions at Grand Cayman are far easier and much more forgiving than those in Lake Superior. The reduced exposure of sport divers to harsh dive conditions could very well improve the safety picture. While no one has scientifically proven this theory, it is certainly an interesting concept.

Perhaps the strongest clues to improved diver safety lie in the area of scuba training. There are many who believe that the improved accident statistics are a direct result of improved training techniques and the wide-spread introduction of advanced scuba classes.

There is no question that diver training has greatly improved over the last decade. We have better certification standards, far better textbooks, more explicit visual aids, better prepared scuba instructors and far better methods of monitoring scuba classes. Today's basic student receives more succinct training in a shorter period of time.

However, the major improvement in diver training appears to be the gradual emergence of advanced diver training classes as a nationwide program. In the early 1970's dive educators talked about the need for advanced diver training, but somehow these programs never got off the ground on a wide-spread basis. It was not until the mid-1970's that advanced diver training was finally accepted by scuba instructors across the country and classes began to materialize. The impact of advanced diver training programs has only been felt in the last few years, as the number of advanced diver graduates began to climb into the thousands. It has been a slow fuse program that has taken years to implement. A recent SKIN DIVER reader survey (1981) indicates that approximately one-third of the active divers have now received advanced diver training and certification.

The U.R.I. report contains additional data to support the theory that advanced diver training can and does improve safety. On page 11 of the report is a brief table which shows the experience level of those victims involved in dive fatalities. The majority of accidents occurred to divers making an early open water dive (30 percent) and divers with little experience (39 percent). On the other hand, accidents occurring to divers with considerable experience were very low (6 percent) and accidents occurring to expert divers was even lower (3 percent). It would appear that advanced diver training is crucial to helping new divers through their first 10 to 12 open water dive experiences — the most vulnerable period of a sport diver's career.

If there is a direct correlation between advanced diver training and the diminishing accident statistics, this report may very well be steering a course toward safer waters.

The University of Rhode Island National U/W Accident Data Center report: U.S. Underwater Diving Fatality Statistics 1970-1978, is available for \$3 (checks should be made out to Scuba Safety) from Scuba Safety, P.O. Box 68, Kingston, Rhode Island 02881.

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April 17, 18, 19, 25, 26 and
May 2, 3, 9, 10
JACKSONVILLE, FLORIDA
April and May Weekends
TORTOLA, BRITISH VIRGIN ISLANDS
April 5-12
OKINAWA, JAPAN
April 30-May 9
MOUNTAIN HOME, ARKANSAS
May 9-16
SAN MARCOS, TEXAS
May 16-23
GRAND RAPIDS, MINNESOTA
May 16-23
PATTAYA BEACH, THAILAND
May 16-23
BOSTON, MASSACHUSETTS
May 25-June 1
NASSAU, BAHAMAS
May 31-June 7
HOLLYWOOD, FLORIDA
May 8-17
FRANKFORT, WEST GERMANY
May 31-June 7
MARIETTA, GEORGIA
June Weekends
MARQUETTE, MICHIGAN
June 6-13
TOKYO, JAPAN
June 6-13
QUEENS, NEW YORK
June 13-20
ST. LOUIS, MISSOURI
June Weekends
GAINESVILLE, FLORIDA
June 14-21
SPENCER, IOWA
June 20-27
EDMONTON, ALBERTA
June 20-27
SAVANNAH, GEORGIA
June 27-July 5
BEACH HAVEN, NEW JERSEY
July 11-18
ALBUQUERQUE, NEW MEXICO
July 11-18
SOUTH CAICOS, WEST INDIES
July 18-25
MARQUETTE, MICHIGAN
July 25-August 1
NEW YORK CITY, NEW YORK
August Weekends
GOTEBORG, SWEDEN
August 8-15
SIDNEY, B.C., CANADA
August 22-29
HOLLYWOOD, FLORIDA
August 14-23
GUAM
August 15-22
ALSIP, ILLINOIS
August 15-22
ONTARIO, CANADA
August 29-September 6
MOUNTAIN HOME, ARKANSAS
September 5-12
COZUMEL, MEXICO
September 19-27
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September 19-26

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Diver's Calendar

April 4 Underwater '81 NAUI Underwater Symposium, Harvard University, Science Center, Boston, MA (Contact: John Burrage, 29 Hull St., Beverly, MA 01915)

April 4 Underwater '81 NAUI Underwater Film Review, John Hancock Hall, Berkeley St., Boston, MA (Contact: Fred Calhoun, P.O. Box 291, Back Bay Annex, Boston, MA 02117)

April 4-5 1981 California Beach Dive Photography Competition, Monterey, CA. Sponsored by Alameda Divers and Aquarius Dive Shop. (Contact: Jim Stratton, contest chairman, 649 Pacific Ave., Alameda, Ca. 94501)

April 4-5 Planet Ocean's 4th Annual Bounty of the Sea Seafood Festival. (Contact: Dora Piccini at Planet Ocean, (305) 361-5786, or write to The Pilots, Planet Ocean, 3979 Rickenbacker Causeway, Miami, FL 33149)

April 5 Northeast Divers Underwater Film Festival, Marywood College, Scranton, PA. Stan Waterman will be featured. (Contact: Joe Donahue, 324 South Main Ave., Scranton, PA 18504)

April 11 Fluid Visions II, Queen Mary, Long Beach, CA. (Contact: Karen Straus, PADI, 2064 N. Bush St., Santa Ana, CA 92706)

April 11 Buckeye Divers Scuba Club, Second Annual James R. Cox Memorial Program, Columbus, Ohio. (Contact: Buckeye Divers Inc., 1246 Carlwood Ave., Columbus, Ohio 43227)

April 25-26 NAUI Southwest Branch Commercial Diving Experience for basic scuba divers. (Contact: Bob Straight, Chairman, 8439 Barklay Drive, Houston, TX 77017)

April 26 5th annual Scuba Sport Rites Club underwater symposium and film festival, State University of New York, Purchase, NY. (Contact: Scuba Sport Rites Club, POB 644, Rye, NY 10549)

May 3 8th Annual Underwater Easter Egg Hunt, Chillicothe Sportsman Club. Sponsored by the Orca Dive Club. (Contact Gary E. Wilson, President, Orca Dive Club, P.O. Box 1587, Peoria, Illinois 61655)

May 8-9 New York State Marine Science Education Association's Annual Conference. Hofstra University, Hempstead, NY. (Contact: Steven Lander, Conference Chairman, at East Rockaway H.S. (516) 887-3111; or Prof. Eugene Kaplan, Hofstra Univ., (516) 560-3261)

May 8-10 Our World Underwater, Radisson-Chicago Hotel/Civic Opera House. (Contact: Our World Underwater, Box 4428, Chicago, IL 60680)

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FREEDOM **UNDER THE SEA**



★ Don't Let Sport Diving Be Held Hostage By Government Bureaucracy ★

By Bill Barada

Today's sport divers may not fully appreciate it, but we enjoy a freedom from governmental regimentation that is now a rare phenomenon in the United States. By contrast, virtually all other activities, both on land and on water, are controlled by a multiplicity of rules and regulations that are usually dreamed up by bureaucrats who have no practical experience in, or sympathy for, the fields they govern.

This freedom under the sea which sport divers now enjoy is due to the pioneering efforts at self regulation and safety education initiated by America's dive organizations shortly after the Aqua-Lung was introduced to the United States in 1949. These first units were imported by a sporting goods dealer in Southern California. Owing to the publicity generated by U.S. Navy frogmen during World War II, these new "toys" were soon selling by the thousands in sporting goods and department stores across the nation — and would-be frogmen were pulled from the water by the hundreds. Some who were rescued explained, "I have to breathe in the water, I can't swim."

Public reaction to the flurry of drownings caused anti-diving laws to be passed by some states and national legislation controlling the sale or use of underwater breathing apparatus was threatened. The solution that ultimately averted this threat was the instructor certification and diver training programs initiated by the Los Angeles County Department of Parks and Recreation and the National YMCA. These groups generated a national campaign of public education on dive safety that was picked up and broadcast by dive organizations, dive clubs and individual divers. The campaign brought about a drastic reduction in scuba fatalities and the political clamor for anti-dive laws subsided.

The programs of safety education and diver training have continued over the years and are now so wholeheartedly supported that about the only way for a person to go scuba diving is to satisfactorily complete a recognized training course. If you doubt this, try to get an air tank filled, rent scuba gear, dive with an organized group, or join a conducted dive tour — without a C card issued by a recognized instructor organization.

Equally significant is that scuba safety training is based upon natural laws rather than man-made laws — and dive students quickly learn there is a world of difference. Unlike man-made laws which can be broken with impunity as long as you don't get caught — when

you violate a natural law of dive safety the reaction is automatic and inevitable, and the consequences can range from a ruptured eardrum to permanent paralysis, or death.

Thus, self policing is virtually automatic because the person who produces an unsafe piece of equipment, pumps bad air, does shoddy repair work, runs sloppy dive trips, or churns out poorly trained instructors or students is quickly spotted and forced to either clean up his act or is put out of business. And we now have a constantly expanding voluntary police force of more than two million trained divers who are backed by competing dive shops, instructors and dive organizations — most of whom are willing and able to call attention to a piece of equipment or a service they consider unsafe.

The success of our self regulatory program is attested to by the fact that scuba diving has chalked up a phenomenal safety record for a sport that was once considered so dangerous that only the foolhardy or suicidal would take it up.

The privilege of self regulation is far from permanent, however, and recent events indicate that recreational diving may be facing the greatest legislative threat of any time in its history.

The opening of the Outer Continental Shelf (OCS) to federal jurisdiction out to 200 miles has given the bureaucracies a whole new world to conquer, and a number of powerful governmental agencies are now competing with each other to stake out claims of influence in the underwater world. Several of these agencies are now writing rules and regulations that show promise of putting sport diving in a straight jacket of bureaucratic red tape.

The initial threat is camouflaged under the guise of conservation legislation. The giant bureaucracies are experts at getting Congress to enact laws for the purpose of "protecting and preserving the resource," of which virtually everybody is in favor (like motherhood). The problem is that each agency is given authority to write rules and regulations that have the force of law. As a result, the bureaucratic regulations often make a mockery of the stated purpose of the law passed by Congress — and there is precious little the people who are being regulated can do about it because the federal agencies are virtually immune to public opinion or political pressure.

A few examples of federal laws that are already affecting sport diving are:

1) **Public Law 94-265 — The Fishery**

Conservation and Management Act of 1976. The clearly stated purpose of this act is to, "provide for the protection, conservation, and enhancement of the fishery resources of the United States."

Unfortunately, implementation of the Act is given to eight regional Fishery Management Councils under the Department of Commerce. Membership in the management councils which write the rules and regulations are heavily loaded in favor of commercial fishing interests. As a result, conservation restrictions are aimed almost exclusively at recreational interests, both fishing and diving, while the take of commercial fishermen is usually unlimited. These councils not only have the authority to limit the species and quantities of marine life we can take, they can also write detailed specifications as to the amount and type of gear we can use — and a violation of their rules can result in confiscation of all equipment (including the boat) plus a \$25,000 fine.

2) **The Marine Protection and Sanctuaries Act of 1972** is administered by the National Oceanic and Atmospheric Administration (NOAA), also under the Department of Commerce. It is significant that NOAA designated *no* marine sanctuaries until after the OCS was opened. But this agency is now establishing sanctuaries off all coastal areas of the U.S.

This program could, and should, be of great benefit to everybody interested in marine conservation and preservation because the stated purpose of the Act passed by Congress is to set aside particularly vulnerable, productive or beautiful areas in order to prevent their desecration. NOAA's rules and regulations make a mockery of this purpose, however. For example, the coral reef sanctuaries of Florida and the Virgin Islands prohibit skin divers from taking anything, and even touching the corals or the possession of a speargun can land you in jail. Yet commercial fishing catches are unlimited and the use of nets and lobster traps, which raise hob with the corals and decimate fish populations, are unrestricted.

The wreck of the *Monitor* is another marine sanctuary. The regulations here prohibit any type of diving other than by approved archaeologists, scientists and VIP's. Boats are prohibited from even anchoring or drifting over the *Monitor*.

Nobody resents diving restrictions on the historic wreck of the *Monitor*, but these regulations are significant in view of the efforts by another federal agency interested in shipwrecks.

3) **The Office of Archaeology and**

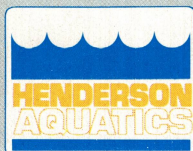
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Historic Preservation, under the Department of Interior, is seeking legislation to "protect the cultural resources" on the OCS. Interpret this as shipwrecks (all wrecks over 50 years old) which may be protected under much the same rules as the *Monitor* — and sport divers will have lost a major underwater playground if the legislation is passed.

4) **The Bureau of Land Management** (the agency that cannibalized and dammed the Colorado River) has also moved into the OCS. This agency did a "good" thing by banning all coral collecting on the OCS — then spoiled it by permitting commercial diving for red and blue corals in the Pacific. The admitted criteria for regulations is economic. Thus, the big operators are allowed to stay in business regardless of the environmental damage.

These examples are only pieces of floating debris that indicate the drift and scope of the federal regulatory current sweeping the underwater world. These examples may prove to be only minor irritations, however. The real threat to our freedom under the sea may come in the guise of bureaucratic "safety regulations" which will be proclaimed as necessary owing to the number of fatalities among scuba divers.

The groundwork for such a move has already been laid by NOAA's funding of the National Underwater Accident Data Center (NUADC) at the University of Rhode Island. The NUADC has compiled fatality statistics for both occupational (commercial) and recreational diving since 1970 and at this writing, results are available through 1978. A careful analysis of the NUADC data by anyone familiar with our sport will reveal that recreational diving has an amazing safety record of which the sport can justly be proud. Unfortunately, these same data can also be misrepresented as horror stories in which neophyte divers introduced to the sport are dying by the hundreds and only federal intervention can prevent continuation of the slaughter.

An example of this kind of misrepresentation appeared as an editorial in the February, 1979 issue of *Sea Technology* magazine under the heading: *Recreational Diving — An Unregulated Monster*. The editorial states in part, "We have no direct involvement in the recreational diving field. But we do cover the professional aspects of diving for fun — training for science, safety, equipment developments and the broader aspects of education.

"Thus, the recent figures of nonprofessional scuba diver deaths released by NOAA are cause for concern. In the U.S. alone the number of fatalities rose from 131 in 1975 to 147 in 1976 . . ." The editorial goes on to say, "Lt. David Peterson, assistant NOAA Diving Coordinator, states, 'Analysis of the figures shows that in many cases the divers who died ignored the teachings of their scuba in-

structors or took chances in unfamiliar situations.' But, he added, 'Scuba can be a safe sport.'"

The *Sea Technology* editor notes that occupational diving in the U.S. has come under federal regulation, but complains that recreational diving remains uncontrolled, and suggests that it is becoming a monster; uncontrollable because of its size (two and one-half million scuba divers). The writer then states that he doesn't know or care how scuba diving compares with other sports, but proclaims that, "Nevertheless, the safety aspects of diving for fun do need some coordinated nationwide attention, and NOAA has taken the first step toward that end."

The misrepresentation of NUADC statistics by this editorial is revealed by examining the scuba diving fatalities for each year from 1970 through 1978, which are:

1970	1971	1972	1973	1974	1975	1976	1977	1978
110	112	119	125	144	131	147	102	116

The *Sea Technology* editor jumped on the sudden increase of 16 fatalities between 1975 and 1976, but ignored the equally sudden drop of 13 fatalities between 1974 and 1975. The truth is that neither of these year-to-year fluctuations are statistically significant (14 of the 1976 fatalities were double deaths in caves — a long-standing problem which self regulation is now correcting). The key is that the average increase in fatalities over the seven year period is around five per year. And this is only significant when expressed as a percentage of the total number of scuba divers active in the sport.

This is readily admitted by the NUADC which states that, unfortunately, no statistically acceptable method of recording the total number of divers or their hours of participation has been discovered. However, a 1973 report by the NUADC states, "A paper by the Manned Undersea Science and Technology Office of the NOAA estimates a 15 percent to 25 percent increase in diver population for 1971-1972, while the numbers of fatalities have increased at less than 2.6 percent. Therefore, the fatality rate per year actually appears to be decreasing."

This means that diving is getting safer every year — and the improvement continues today — which is illustrated by comparing the number of fatalities with estimates of the total United States diver population.

The 1973 diver population estimated by the NUADC was one-half million. The real boom in diving occurred after 1973, however. SKIN DIVER Magazine estimates the total number of divers in 1979 at 2,500,000 and, according to the government's estimate of a 25 percent increase in the number of divers each year, we had a diver population of about one million in 1976.

Thus, the 500,000 divers in 1973 produced 127 fatalities (less than 25/1000 of

one percent). And the 1,000,000 divers in 1976 produced 147 fatalities (less than 15/1000 of one percent).

This is an amazing safety record when we consider that America's amateur divers consist of men, women and children of all ages from all segments of society, and they are probing the bottoms of the world's oceans, lakes and rivers from the arctic to the tropics.

Under such conditions the loss of some divers is inevitable and the real wonder is that so few have perished. This is particularly true when we realize that scientists consider the underwater world more hostile to humans than outer space.

Yet, as documented by NUADC statistics, the self regulation system of sport diving has established exactly the type of safety education and training program needed for people to enjoy this hostile environment in reasonable safety.

The performance record chalked up by sport diving equipment is an equally exciting success story. The NUADC states, "In 1976, no fatality could be directly assigned to a properly maintained regulator as a primary cause. This observation has been consistent in each of the years of this study despite the adverse effect of news reports, which, in most cases, have erroneously attributed the accident to equipment failure." There was one case in 1978 in which an almost new and well-maintained regulator failed, but this was the first failure of its kind in 1100 cases in nine years — and it occurred under extraordinary circumstances.

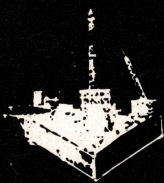
The same observation generally holds true for other dive equipment. The NUADC does list some "equipment related" causes of accidents such as: Losing one's boat while diving offshore, over-weighting at depth, weightbelt entanglement, poor maintenance of regulator, equipment tied on victim, tank fell from backpack, victim strangled by neck strap.

These are obviously human errors, however, and have nothing whatever to do with the dependability of dive gear or services. The significant fact is that not a single dive fatality in the NUADC records can be attributed to unsafe equipment design or to the quality of workmanship and material.

Thus, the NUADC data tell us that American sport divers enjoy the finest and most reliable scuba equipment and services available anywhere in the world.

These statistics also tell us that recreational diving is a shining example of the way in which the American free enterprise system can, and should, work — through self regulation and self policing.

However, the privilege of self regulation may soon be forfeited due to the modern sport diver's unwillingness to become involved in the fight to protect it from government intervention. An example of this apathy is the lack of reaction to the *Sea Technology* editorial. A few years



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ago such an attack on our system would have stirred up an avalanche of letters from irate divers and dive organizations determined to set the editor straight and keep NOAA off our backs. Yet, although the editorial was reprinted in *The Underwater Reporter*, published by the Underwater Society of America, and the Unregulated Monster heading was mentioned in SKIN DIVER, the response was zilch.

Perhaps this disinterest is due to a lack of conviction that the threat of federal regulation is very real. But, as anybody who is familiar with bureaucratic methods can tell you, NOAA's first step at establishing "some coordinated nationwide attention" on the safety aspects of recreational diving should be interpreted as bureaucratic doublespeak for an attempt to build public support for a regulatory program. And since dive fatality statistics are used, it follows that sport diving's self regulatory system for controlling equipment, services and training is the target.

If this interpretation is correct, sport diving is headed for the biggest legislative battle in its history and the stakes are astronomical. As experience in other fields has demonstrated, once the bureaucrats get their toes wet, no detail of our sport will be too insignificant for them to tackle. If they follow past precedents, we can expect to see regulations dreamed up by ambitious career professionals that encompass everything from the size and length of snorkels to the design of compressors and dive boats — and from the minimum and maximum age and physical requirements for sport diver certification, to specifications on the qualifications required for dive guides, tour operators and instructors. Everybody will probably be licensed and everything regulated in such profuse detail it will require a specialized lawyer to decipher the rules — and in such volume the U.S. Navy Diving Manuals will look like basic primers.

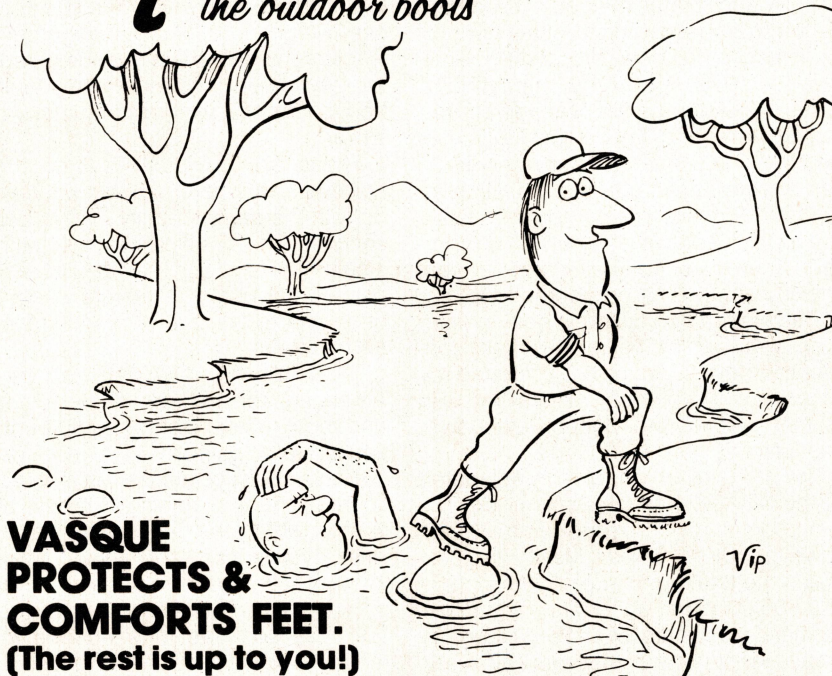
Once Big Brother steps in, the responsibility for performance and quality will be transferred to the bureaucrats, legalistic man-made rules will be substituted for natural laws, and opportunists who produce unsafe products or deliver lousy services can hide behind the claims that their sloppy stuff meet minimum federal standards.

All is not yet lost, however. Big Brother is only beginning to get his feet wet in the underwater world, and if all facets of sport diving join together in the fight we can still win the battle to preserve our freedom under the sea. If we do not join together and present a united front, however, we will lose. And perhaps that is what bureaucrats are counting on.

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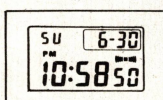
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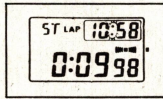
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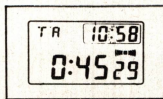
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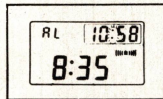
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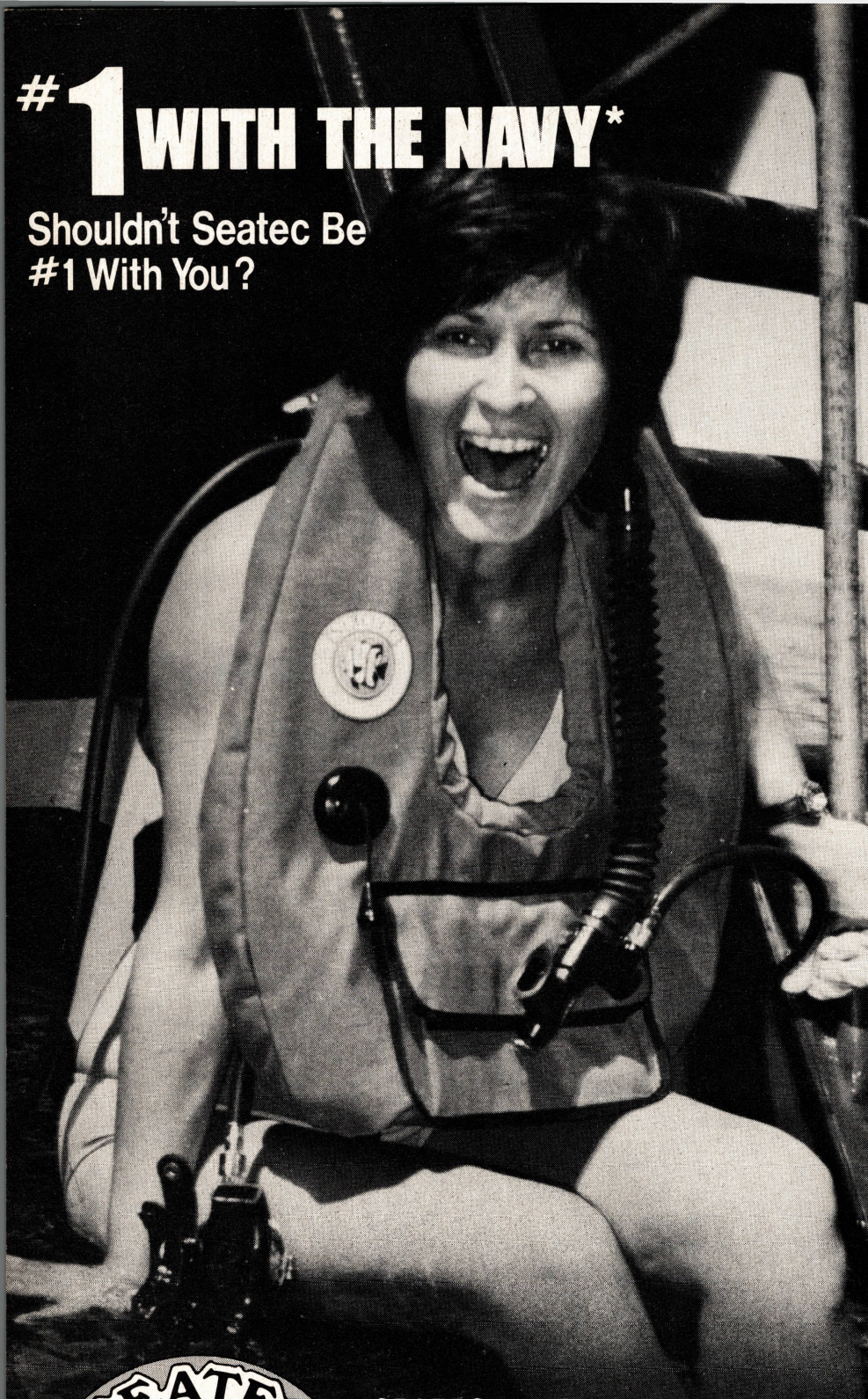
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For further information contact Gary Wilson, President, Orca Dive Club, P.O. Box 1587, Peoria, IL 61655. 🐠



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FOR DIVERS

BY CHARLES V. BROWN, M.D.

LUNGS UNDER PRESSURE PART II

Last month we began a discussion of the effects of pressure on divers' lungs. The topics covered were: lung under-pressure, over-pressure and circulatory effects. We continue our discussion . . .

AIR EMBOLISM

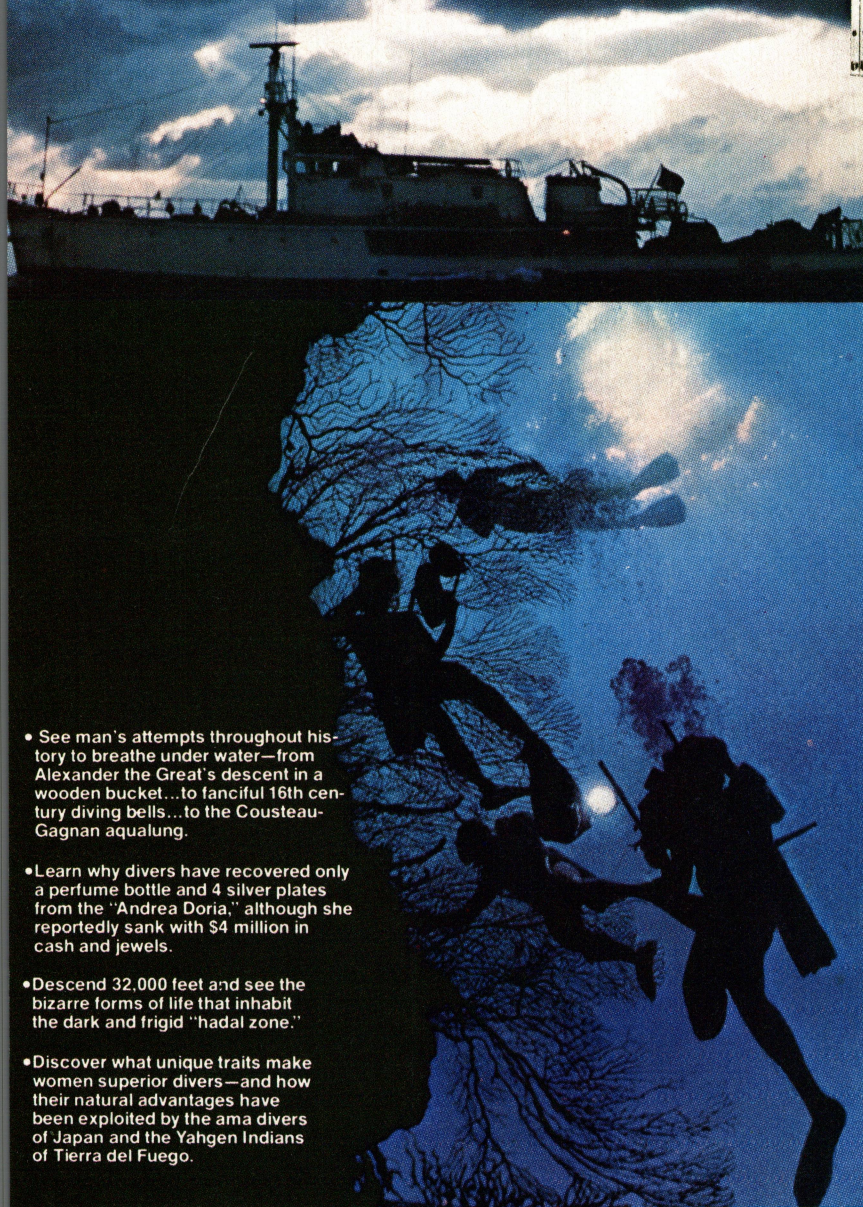
Analysis of lung barotrauma cases in the U.S. Navy showed air embolism to be the commonest associated disorder. Half of the cases produced air embolism, compared to a fifth for pneumomediastinum and a tenth for pneumothorax. This is unfortunate, since air embolism is the most serious.

A lung tear opens many capillaries and possibly some small veins. When breath-hold ascent is the cause, air probably enters the torn vessels only after the victim surfaces and releases his breath, since during ascent the over-pressure keeps them collapsed. The air is swept down the pulmonary vein to the left side of the heart, which pumps it into the aorta. The first branches are the coronary arteries. Occasionally a bubble will enter one of these and precipitate a heart attack or ventricular fibrillation.

Most bubbles, however, are swept upward into the larger carotid arteries and the brain, where they can cause a stroke. Symptoms appear quickly. They reflect

(Continued on Page 20)

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Anatomy of a Shark Bite

Text and photography
by Howard Hall



Ron and Valerie Taylor are among the top underwater photographers in the world. Much of their fame stems from 20 years of photographing sharks. During this time, they have suffered a variety of minor cuts and bruises and several chillingly close calls, but despite nearly countless adventures with sharks they have remained unbiten. Until recently. On June 26, 1980, the shark bit.

We were working on a film segment for an ABC show called, *Those Amazing Animals*. Ron and Val were to appear in the film doing their thing with sharks. Marty Snyderman and Fred Fischer were my safety divers and I was shooting the underwater film. Before Ron and Val entered the water, Marty and I went in to film simple shark scenes. The water 30 miles off the coast of San Diego was especially clear that day and the sharks were considerably more numerous than usual. After chumming the water for four hours we had nearly two dozen blue sharks and they were noticeably bolder than usual. Blue sharks are seldom aggressive. But what they lack in aggression, they make up in boldness. They have absolutely no fear of divers and will swim right up to you without making customary passes or circling. Their lack of aggression allows them to be easily deterred with a gentle prod from an unloaded powerhead or slight slap with a hand. They move quite

slowly and this gesture of resistance is simple to do. What is not simple is keeping track of the two dozen or more sharks that are around you, many of which are only a few feet away. If you do not see a blue shark approaching, it may well bite. After all, there is the smell of food in the water and that is why the sharks have come. For this reason you must constantly be turning and checking the sharks around you. This constant movement can be exhausting. To relax for a moment could be fatal. If one of us is involved in some activity such as filming, we take a safety diver whose job it is to protect our blind side.

When Marty and I completed the first dive, we were both winded. The blue shark activity had been intense and we knew it would be worse on the next dive. Marty was slightly shaken and insisted on a second safety diver for the next dive. Fred Fischer was elected. Being a safety diver is a highly skilled job. These divers have spent numerous hours inside a shark cage observing shark behavior and they have trained themselves to take positions that enable them to keep sharks off themselves and the person they are protecting. Safety divers must be prepared to make the decision to fire the powerhead — not an easy decision under stress. The powerhead would not be used against a blue shark since they can be discouraged with a

gentle prod, but the weapon can become necessary if a more dangerous species, such as a mako shows up. Makos occur with regular frequency off the coast of California and for every 15 or 20 blue sharks attracted on a given day, you can expect to see at least one mako. Fortunately, we had no makos on June 26, but we had worries enough without them.

When Ron and Valerie entered the water, Marty, Fred and I were 40 feet below the boat in position to shoot a silhouette. The Taylors entered the group of sharks and immediately began fending them off. Valerie had a baitfish with her and Ron had his movie camera. The Taylors had experienced this kind of action so many times before that they were totally relaxed. They had never sustained a serious injury and there was no reason to believe that today would be different. Of course, there is absolutely no way to evaluate the risks of diving with baited sharks: Not enough people do it for there to be any statistics on injuries or fatalities. You can only guess the dangers. Since the Taylors have had so much success pushing the limits of safety while diving with sharks, many of which would seem more dangerous than blues, they estimated the risk of diving with baited blues as low.

"Sharks constantly approached, but I hit them away with the fish I was carrying. They seemed faster and more aggressive than usual, but I wasn't worried, in fact I was pleased. Conditions were so good, the action fast. Everything better than normal. I thought, 'Wow! Alan Landsburg is going to get a super piece of film.'" Valerie Taylor.

I finished filming my silhouette and began swimming up to the Taylors. Valerie was teasing a large blue in front of her. Ron had just completed filming the scene and had begun winding his camera. Val was not checking the water behind her. Her legs were hanging immobile. A six foot blue swam up slowly, decided that her leg was the source of the bait he smelled and bit. Val could easily have fended him off with a flick from her fin but she didn't see him coming.

"I was offering my fish to the second shark when I felt a thump to my lower left leg. Looking down I saw a shark holding it in his mouth. Instantly I began to hit the shark. I grabbed its nose and tried to push it off my leg. There was no horror or fear, just annoyance that the shark was so persistent. On the fourth hit, it reluctantly withdrew its jaw. I saw the gum, followed by white saw teeth, retract through the thick orange neoprene. Green blood gushed out clouding the water. I knew it was deep. The shark dashed away. I grabbed my leg holding it tightly to stop the blood. Suddenly Howard was there, and Ron. I surfaced and called to the above water camera crew, 'Start filming. I have been bitten and I think it's deep.' I

found myself being escorted back to the Sand Dollar 30 meters away. Someone was helping me, Ron or Howard I think, but I can't remember too well." Valerie Taylor.

Valerie had sustained a six inch gash just below the calf muscle, approximately one and one-half inches deep or more. Fortunately she has large strong legs and the injury failed to damage any major vessels. Had an artery been severed, blood loss and shock could have been extremely dangerous. Forty-five minutes later, Val and Ron were in a Coast Guard helicopter on their way to University Hospital in San Diego where a plastic surgeon would sew up her leg with three layers of stitches. Three weeks later Val Taylor was back in the water. With sharks, of course.

There is something I would like to say as a result of this incident. Diving with baited sharks is dangerous: It should be assumed that it is highly dangerous and no safety precaution should be omitted. Val Taylor is not the only person I know who has been bitten by blue sharks. Steve Early, Pierre De Les Pinios, and I have also sustained minor injuries. Steve and Pierre were bitten on the head. In two of these cases however, the sharks applied no pressure, immediately realizing, perhaps, that what they had in their mouths was not food. In Steve Early's case the shark had to be pulled off but fortunately it had grasped Steve's hood and his head sustained only minor cuts. The question then arises, were we three lucky not to have been hurt more? Or was Valerie very unlucky and the exception to the rule? No one knows. But certainly this is not the last time filmmakers will be filming blue sharks and sooner or later someone else will be bitten. It is a dangerous business and should be attempted only by the experienced.

Sharks are wonderful animals. They are sleek, graceful and fascinating. Many species of sharks have remained relatively unchanged for 100 million years or more. Many people call sharks stupid because their central nervous system is less complex than ours. This is an uneducated attitude. Certainly, sharks are not capable of building tools, machines and industries to eradicate other species; poison and over populate the environment; and wage war. But this doesn't mean that sharks are not successful. Do you think man will be around 100 million years from now? Sharks probably will.

"Working with sharks is part of our business as underwater filmmakers. Just as a racing car driver or a jockey must expect to have an accident someday, so too, did I. I bear no malice toward the shark and I hope that other people reading my story understand this and experience no malice or added fear regarding these animals because of what happened to me." Valerie Taylor. 

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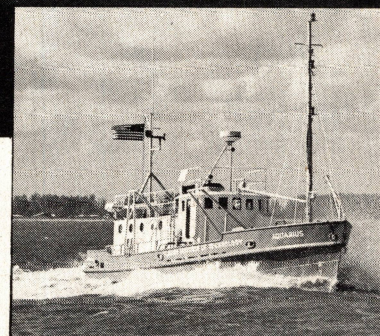
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Rx FOR DIVERS

(Continued from Page 16)

disordered brain function such as; dizziness, visual disturbance, uncoordination, and muscle paralysis. Eyewitnesses to embolism cases commonly describe a fast ascent; the diver confused, shouting and unable to function, with blood in his mask. Often the victim loses consciousness, and without treatment death or permanent disability is likely.

We've described a number of settings for lung tear and possible air embolism. Here are two more. A fellow trying to impress friends made a very deep breath-hold dive, sneaked some air from a scuba buddy staked out down there, and embolized on the way up. You don't have to be very deep to embolize. A boy took an inverted bucket to 11 feet, breathed out of it, and embolized going up. Cases have occurred in swimming pools. Experimental dogs have embolized after three and a half to four foot ascents, and presumably people could too. It's far more dangerous for a scuba diver to hold his/her breath during short upward excursions in shallow water than in deep water, because the volume increase per foot of ascent is greater.

The commonest cause of embolism in people who don't hold their breath is probably small airway inflammation. Professor Walder, who has investigated many British Navy dive accidents, said that the divers he knew who embolized from short, shallow dives had had a cold within the previous ten days.

Immediate first aid for the air embolism victim is to place him in reverse slant. The idea was to make bubbles hug the inside of the aortic arch, away from the carotid arteries and brain. The validity of this idea is controversial, but is probably irrelevant since whatever air enters the circulation probably does so all at once. Nonetheless, animal experiments have shown that reverse slant promptly instituted sometimes reverses the effects of cerebral air embolism. A possible explanation: the slant position increases return of venous blood from the lower limbs and abdomen to the heart, which fills more than before and therefore contracts more forcibly (a well known principle in physiology). The sudden increase of blood pressure in the carotid artery may be enough to drive the obstructing bubbles on through the capillaries and out of the brain.

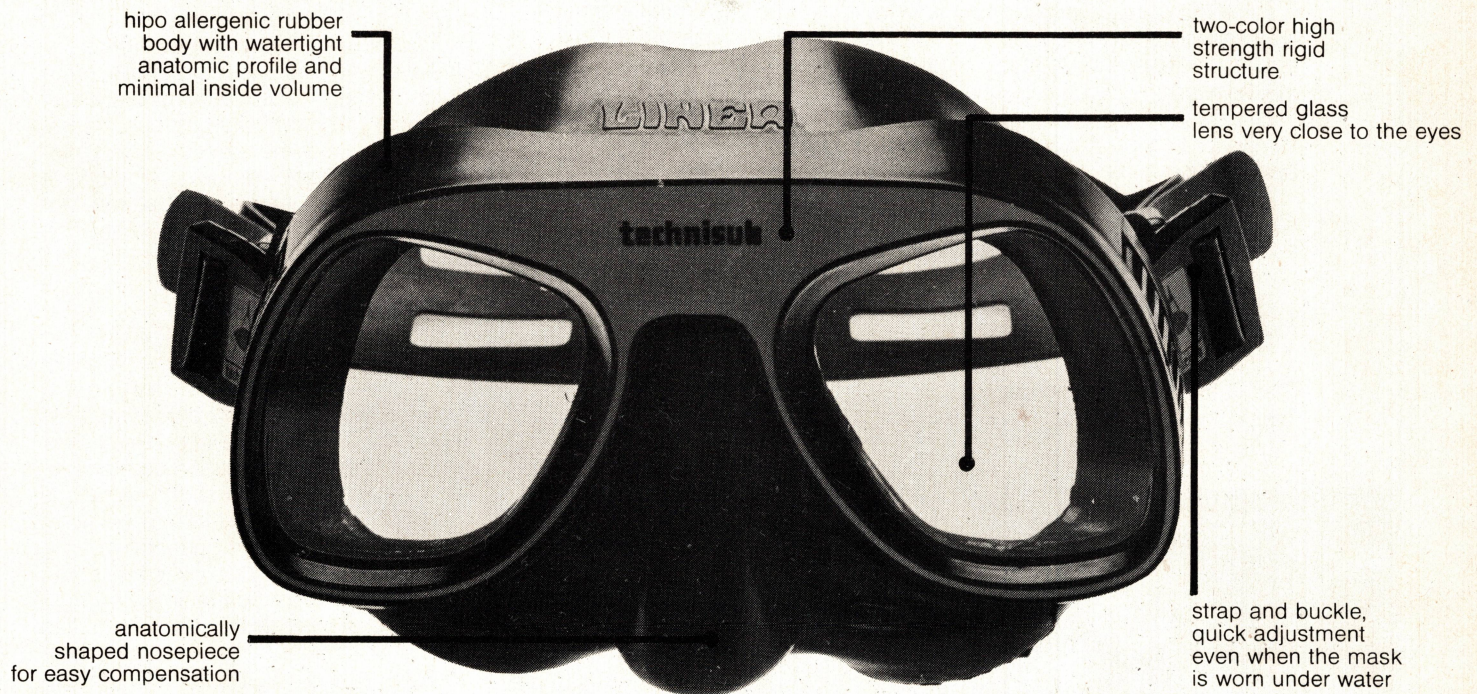
Another first aid measure of great value is oxygen breathing. It helps support cell life in areas of embarrassed circulation, and also speeds resolution of bubbles. Definitive treatment is of course recompression at the earliest possible moment. The longer the delay, the less chance of a successful outcome. But always give it a try, since victims have re-

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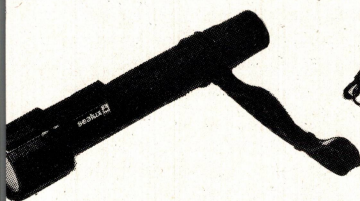
FROM THE LEADERS IN MASK DESIGN

LINEA

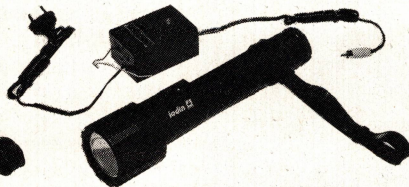
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Rx FOR DIVERS

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PNEUMOMEDIASTINUM

Pneumomediastinum occurs when air from torn alveoli dissects its way down along the larger vessels and bronchial tubes into the mediastinum — the central compartment of the chest. Small amounts cause no symptoms. Large amounts compress the heart and great veins, reducing venous return and cardiac output enough to cause shock. Trying to escape from the mediastinum, the air will usually percolate up into the soft tissue of the neck (subcutaneous emphysema). The best clue comes from your fingertips. Place them just above the clavicles and you'll feel the characteristic crackling sensation that's a dead giveaway. Another clue is a squeaky voice. Only severe cases need treatment, but the patient should be held near a chamber anyway and observed for signs of air embolism. They sometimes go together.

PNEUMOTHORAX

The lung, being elastic, is always trying to contract. It succeeds when a break in its pleural envelope allows air to get in between the lung and the chest wall. This is pneumothorax. The air may have broken through from a pneumomediastinum, or from a ruptured emphysematous bleb on the lung's surface. The former route is probably more common in accidents provoked by lung over-pressure.

On land, blebs occasionally rupture without apparent provocation, resulting in spontaneous pneumothorax. This is common enough in the general population, especially young men, that it was only a matter of time until it would occur underwater. Finally it did. A young man was cruising at 20 feet, when suddenly he felt a pain in his chest. He ignored it for a while. Then he leaned downward to check out a hole, and the pain moved to his kidney area. Puzzled and now concerned, he decided to go up. With ascent came shortness of breath, and he surfaced in severe distress. He had tension pneumothorax. Emergency treatment saved his life.

The lesson here is that while provoked pneumothorax usually occurs near the surface, spontaneous pneumothorax can occur at any depth, and ascent will convert it to tension pneumothorax. Air expanding in the pleural space pushes the mediastinum against the intact lung, embarrassing both cardiac function and gas exchange. It's often fatal.

When there's one bleb on a lung, there are virtually always more. Therefore, the

(Continued on Page 30)

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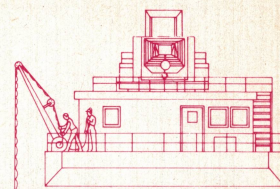
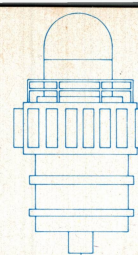
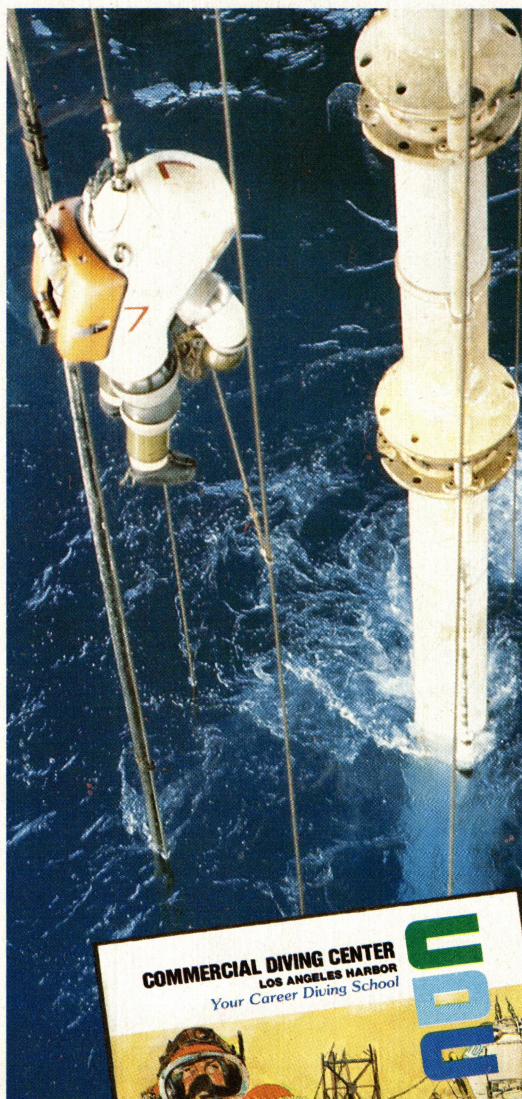
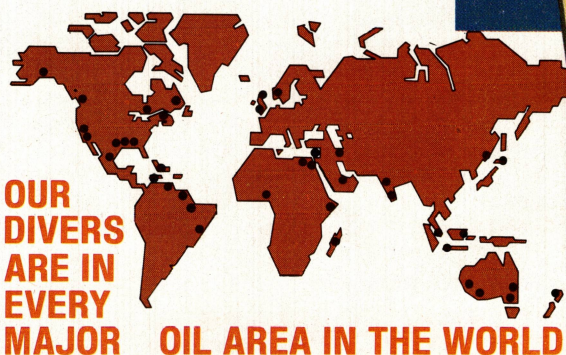
Oceaneering International designed Commercial Diving Center's training programs, moving over 40% of the graduates into key jobs under worldwide diving contracts. The others may opt to work for some 200 diving contractors who look upon C.D.C. as a producer of high-quality trainees ready to take on any job with any type of equipment.

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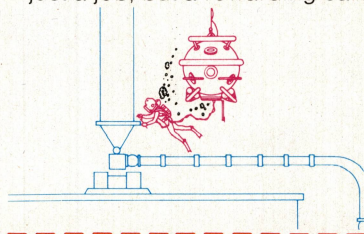
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eye CONTACT

TEXT AND PHOTOGRAPHY BY
JIM AND CATHY CHURCH

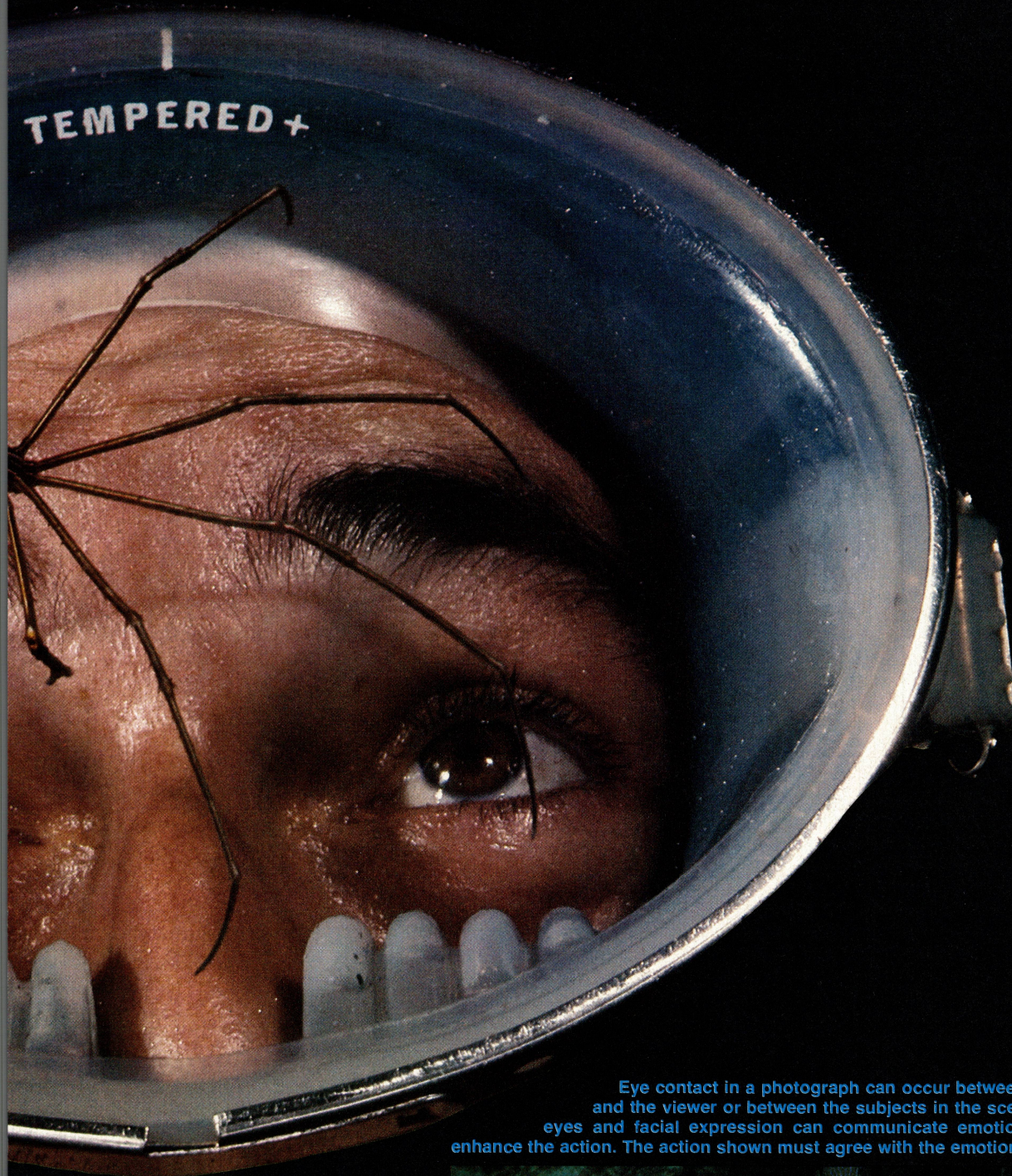
Eye contact is one of the many important elements of photo composition. The difference between a good picture and a throw-away is often how the viewer reacts to your subject's eyes. This is where the viewer looks first, searching for signals eyes can communicate. Enthusiasm, interest, boredom, frustration, fear or anger; any of these emotions can be communicated with the eyes and facial expression. If the viewer senses a disturbing emotion, he/she will probably not enjoy your picture.

"Don't look at the camera," is the standard rule you've heard or said dozens of times. The idea is to avoid the blank stares and forced smiles (say, "cheese") that often look out at you from pictures.



You want your models to be part of the underwater scene, to appear as if they belong in the picture. If you are photographing a diver feeding a friendly fish, for example, the diver should be looking at the fish. Should the diver sneak a peek at the camera as you trigger the shutter, the mood of the picture is broken. Even in scenics, where the diver isn't interacting with a sea creature, staring at the camera can also break the mood. The viewer

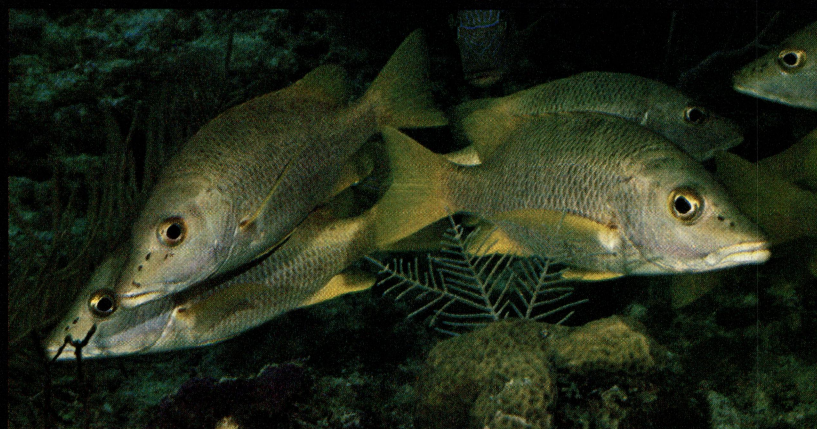




Eye contact in a photograph can occur between the subject and the viewer or between the subjects in the scene itself. The eyes and facial expression can communicate emotion which can enhance the action. The action shown must agree with the emotions expressed.

wants to be the observer. Having the eyes of a stranger staring back can make the viewer feel uncomfortable.

"I'm looking for posing instructions," is the message being sent when your model persists in looking at you. At this point, it is usually best to stop taking pictures and communicate with your model. Be patient and write instructions on a slate if necessary. If your model is confused, the eyes (and overall body language) will show this



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SETTING THE PACE.

in your picture. Give the model something to look at.

There are times, however, when you will want the subject to look at your camera. If the subject is someone you know and like, you may enjoy direct eye contact with the person in the picture. You're not being stared at by a stranger, you are in eye contact with a friend. This is why the eyes of entertainers often stare out at you from promotional portraits. If you are a fan of a particular actor or singer, you may enjoy this eye contact. Strangers often stare out from advertisements and magazine covers, but these models are often sexually attractive persons with whom you may also enjoy eye contact.

THE FACELESS DIVER

You've probably seen the faceless diver shot. The details of the regulator are sharp, and perhaps you can even read "tempered lens" on the faceplate, but you can't see the divers eyes or face.

Aiming the strobe directly at the model's face is often the best lighting technique to illuminate and show the face. However, don't blast light skin with harsh light. Keep the strobe back and expose for the skin tones, or hold the strobe back to the fill position for a sunlight exposure. An upward tilt of the model's head can often catch sunlight within the mask. If the model is facing you, and looking to your right, handhold your strobe arm across your body to aim the light in from your right. Yes, you can expect some occasional reflections from the strobe to appear on the faceplate. Therefore, take several shots with the strobe held at slightly different angles. If your model's mask forces her lower eyelids to bulge slightly, aim the strobe straight at her face. Aiming your strobe at a downward angle causes shadows which accent the baggy-eyed look.

The model's mask can sometimes reflect a mirror image. When looking at a coral formation, for example, an image of the coral may appear on the faceplate. Unless you are working for a special effect, this mirror image is an error that blocks the view to the model's eyes. If you are excited about the picture — especially if you are composing with a small, SLR viewfinder — you may not notice the mirror image until after your film is processed. Look for mirror images before you shoot. Usually, a slight change of angle will make them disappear.

If the inside of the model's faceplate is fogged over, or if the surface isn't clean, the view to the model's eyes can be totally or partially blocked. Simply scrub the inside of the faceplate with ordinary household cleanser — regardless of what you've heard, we've never scratched the glass. After scrubbing, the old spit and rinse technique is all you really need.

THE ANONYMOUS DIVER

Not all faceless diver shots are bad. Suppose, for example, that you were hired to shoot advertising shots of a new regulator. And to make the pictures realistic, the company wants you to show it in use. You now have a problem: Your purpose is to draw the viewer's attention to the regulator, but the model's eyes will compete for attention. Therefore, you might choose to compose and light the picture so the regulator is prominent, but the model's face is dark within the mask. You might use a non-translucent mask and two strobes for extreme side lighting from the left and right.

FAKING IT

There are times when you must fake the action to gain eye contact. For example, suppose you wish to take a portrait of an underwater photographer using a large housed camera. If your photographer/model uses the housed camera correctly, with an eye pressed against the SLR viewfinder port, the model's eyes and face are hidden behind the housing. Simply have your model look up over the top of the camera housing so his/her eyes are in view. It doesn't matter that your model isn't using the SLR viewfinder correctly — most viewers won't notice the

difference. Remember: It is the model's eyes that the viewer seeks out.

IMPLIED EYE CONTACT

Interest and action can overpower the need for eye contact between the viewer and the subject. In one of our pictures, Cathy is fending off Waldo (a large moray eel) by pressing the faceplate of her mask directly against his face. Although the view to Cathy's face is blocked by the eel's face, eye contact between Cathy and Waldo is implied.

Silhouettes don't require eye contact because it is the subject's outline and shape that communicates with the viewer. If there is any interaction between the diver and other subjects, however, the diver's head should be angled to imply eye contact between the diver and the other subject. Likewise, if a diver is swimming through a scenic setting, the head should be angled to imply eye contact with the diver's assumed destination.

A MASK FOR POSING

Having the right mask for posing can enhance eye contact. Choosing the mask that is right for you may take some thought because there isn't any one mask that is universally right for everyone.



Above, the eye of the porcupinefish draws attention and gives it personality. Left, Cathy and the prickly little fellow are eye-to-eye and the expression on Cathy's face indicates she finds the encounter a bit comical. Looking elsewhere would break this mood.

If you prefer a goggle-style mask, be careful not to choose a mask that gives you a bug-eyed appearance. Likewise, be careful not to choose a mask with a large purge valve that gives you a Miss Piggy appearance. Such masks may be comfortable, but they aren't always photogenic.

Choose a mask that doesn't hide the eyes or block light from reaching them. Masks made from translucent material allow more light to reach the eyes and face. Non-translucent masks can block light. Colored rims around the faceplate or goggles may photograph well, especially if color-coordinated with other accessories, but can be distracting if overdone. And too much chrome, of course, will cause reflections. A simple design is often best.

The fit of the mask is a key factor. Your skin shouldn't be stretched tight or compressed into wrinkles, nor should the mask force your face into a pug-nosed expression. The mask should allow you the flexibility to smile, especially with your eyes. Lastly, the fit must be comfortable because any discomfort will be evident in your eyes and expression.

A prescription mask must be chosen carefully. A rounded or oval faceplate with rounded prescription lenses can give you a bug-eyed appearance. A mask with a rubber nosepiece, and with the prescription lenses cut to fit around the nosepiece, may be more photogenic. The mask will have a more natural resemblance to the topside glasses that viewers are accustomed to seeing. If the prescription is optional, and you can get along without it for limited periods of time, there is another option: Purchase a non-prescription mask for posing, or wear contact lenses.

POSING TIPS

Learn how to smile pleasantly underwater. Smiling may require practice because the mask and regulator can change your expression and cramp your facial muscles. It is difficult to smile convincingly if you're uncomfortable. Make sure that your equipment fits correctly, that your buoyancy is under control, and that your mask isn't flooding or fogged. You can't hide discomfort — your eyes will show it.

Yes, you will have to look at the photographer while setting up shots. In fact, you can sometimes help with composition by watching your image in a photographer's dome port. But once it's time to shoot, keep your eyes on the action. You'd be surprised how well you can see the photographer from the corner of your eye, without actually looking at him/her.

Don't turn your face away from the strobe unless you've been directed to do so. But if turning your face toward the strobe results in an unnatural body posi-



The eye contact here seems to express a cautious mutual inspection between diver Bonnie Charles and the fish. A translucent mask allows light to illuminate the model's face.

tion, you'll have to pose differently, or the photographer will have to shoot at a different angle.

Should female models wear eye makeup? Some models, in our opinion, look better without makeup — they photograph well with a natural look. If you do use eye makeup, we suggest that you apply it as for above water use — don't overdo it just because you're going underwater. Avoid anything that will run, streak or irritate your eyes.

CREATURE EYES

Eye contact is also important with portraits of sea creatures. The tiny yellow or blue eyes of a hermit crab — peering at you from under the edge of its shell — can be the most interesting part of the picture. You can look at the creature's

eyes and imagine any emotion that fits the picture. Look back through your past issues of SDM and see how many close-ups of marine life show the eyes. Many octopus portraits, for example, would lose much of their impact if you couldn't see an eye.

If the creature's eyes are prominent in the picture, the eyes must be sharply focused. You will tolerate loss of sharpness as depth of field diminishes, as long as the subject's eye is sharp. Thus, whenever you are working with limited depth of field, focus on the creature's eyes. But if you are using an SLR camera, and centered an eye in the viewing screen to focus, recompose the scene in the viewfinder before triggering the shutter. You may not want the eye centered, but automatically do so when focusing. 🐠

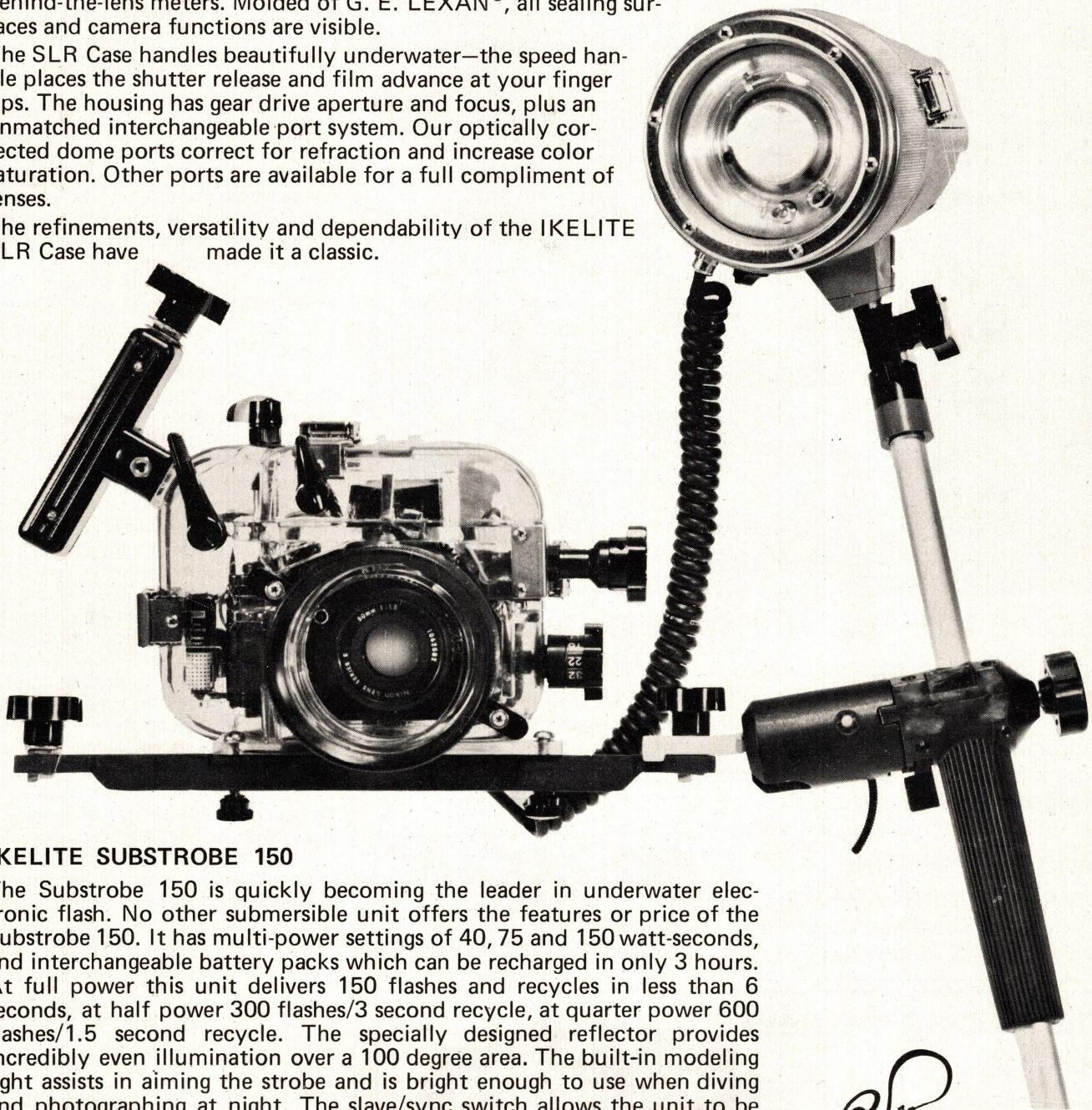
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Rx FOR DIVERS

(Continued from Page 22)

recurrence rate for spontaneous pneumothorax is substantial. Minor over-pressure stresses encountered in ordinary diving would make recurrence in the water even more likely. Anybody who's had one episode should not dive again. Occasionally blebs will show on X-ray, so anyone who plans to start diving should have a chest film.

Predisposition to pneumothorax is partly hereditary (blebs), but it's also partly acquired. Anything that interferes with easy exhalation favors bleb growth. Asthma is a prime example. So is chronic bronchitis from smoking cigarettes. A published review of 164 spontaneous pneumothorax cases showed that the overwhelming majority of victims were smokers and 54 of them used more than two packs a day. Only 7 were known not to smoke.

With a little training you can learn to recognize high degrees of pneumothorax — say when the lung is more than half collapsed. Start with the symptoms. More than 90% have pain, usually on one side, anywhere from mild to severe: 70% admit to shortness of breath; 10% cough. Then examine the bared chest. If you percuss it the way a carpenter would a wall to locate studs, you'll notice a difference on the two sides. The pneumothorax side will be more resonant — more like a drum. Then place your ear against each side of the chest in turn and have the victim take deep breaths through his open mouth. You'll hear normal breath sounds on the good side and little or nothing on the other.

If you ever do find pneumothorax in a diver, the first aid is to loosen anything that restricts breathing, have him lie quietly with the affected side down, give him oxygen, and arrange transport to a medical facility. If he should require mouth to mouth or other form of assisted ventilation, try to avoid large inflations. They may re-open the lung tear and force more air into the pleural space.

When a dive accident victim is in a chamber, it's important to detect even a small pneumothorax. Otherwise, decompression will expand it, possibly to a fatal tension pneumothorax. An instrument called the Sonicaid now enables a tender to make the diagnosis with confidence. Placed against the chest wall, it senses the noise made by lung tissue in motion. Even a small collection of air between the probe and the source creates a strong barrier to sound transmission, thereby revealing itself as a pneumothorax.

If pneumothorax is discovered, a doctor can be locked into the chamber. He'll insert a chest tube with a one way valve or a suction device to remove the pleural

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Avon inflatable boats available worldwide. For catalog and dealer locations, contact an Avon distributor: Seagull Marine, 1851 McGaw Avenue, Irvine, CA 92714; L.F. Burgess & Associates, 1410 Speers Road, Oakville, Ontario L6L 5M1; Inland Marine, 79 East Jackson Street, Wilkes Barre, PA 18701; Imtra Corporation, 151 Mystic Avenue, Medford, MA 02155.

RX FOR DIVERS

air. If there is no doctor or no chest tube, a large bore needle inserted between two ribs will at least relieve a tension pneumothorax and make decompression possible.

RECOGNIZING PULMONARY BAROTRAUMA

Any unexplained distress upon surfacing from a scuba dive, or soon thereafter, creates a presumption of pulmonary barotrauma. Air embolism, pneumomediastinum, and pneumothorax can occur singly or in any combination, so if there's a hint of one, look for the others. The symptom list includes: chest pain, shortness of breath, coughing up blood, voice change, any evidence of brain dysfunction, weakness or shock, and even limb pain. Check the skin and lips for cyanosis, indicating poor gas exchange. Feel for pulse rate and strength and for subcutaneous emphysema. Listen to the breath sounds. Then do a simple neurological exam: Is the victim confused or disoriented? Can he speak and hear normally? Can he count fingers? Can he feel pin pricks, stand on one foot, touch his nose with his eyes shut, etc?

SUMMARY

The medical checkup for prospective divers should focus on uncovering disorders that predispose to barotrauma. Scuba divers should be taught not to ascend while anything is interfering with the upper airway, and not to dive with any condition that might block lower airways. Both scuba and breath-hold divers should avoid descending with their lungs empty. Divers should not use a long, strong valsalva maneuver. Any evidence of lung tear mandates transport to a chamber and observation for possible air embolism. Any evidence of air embolism mandates immediate recompression. Oxygen is excellent first aid for any form of lung barotrauma. 

NIKONOS BOOK SUPPLEMENT

A four-page supplement (pages 97-100), which includes specifications and use of the Nikonos IV-A camera body and Nikonos SB-101 Speedlight, is now available. This supplement is keyed to *The Nikonos Book*, by Jim and Cathy Church, and slips inside the back cover. The authors will include free supplements with all present and future shipments of books to their wholesale distributors. Individuals who purchased *The Nikonos Book* in the past may obtain a supplement by sending 10 cents and a pre-addressed, stamped envelop to: Jim & Cathy Church, P.O. Box 80, Gilroy, CA 95020. 

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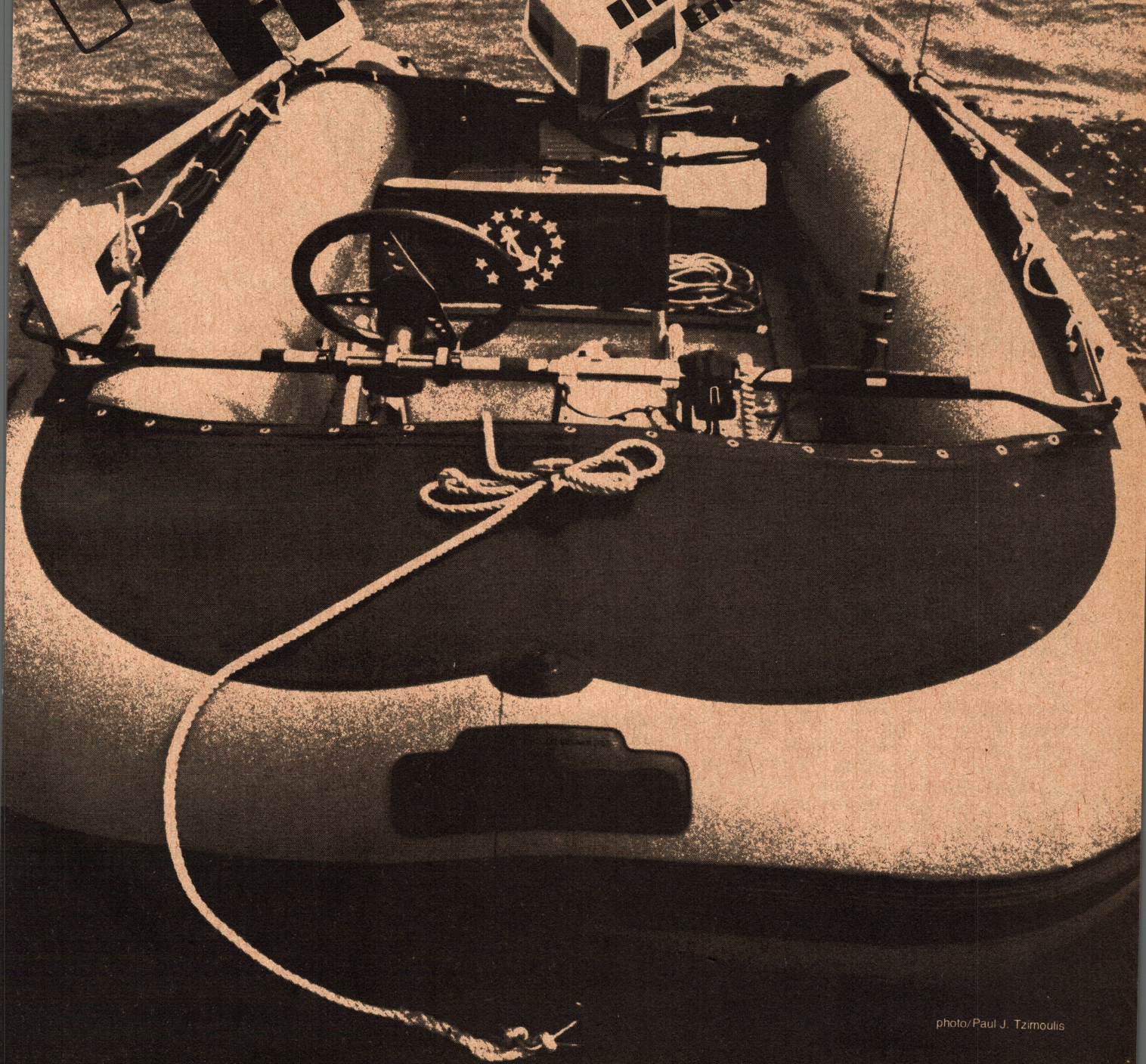


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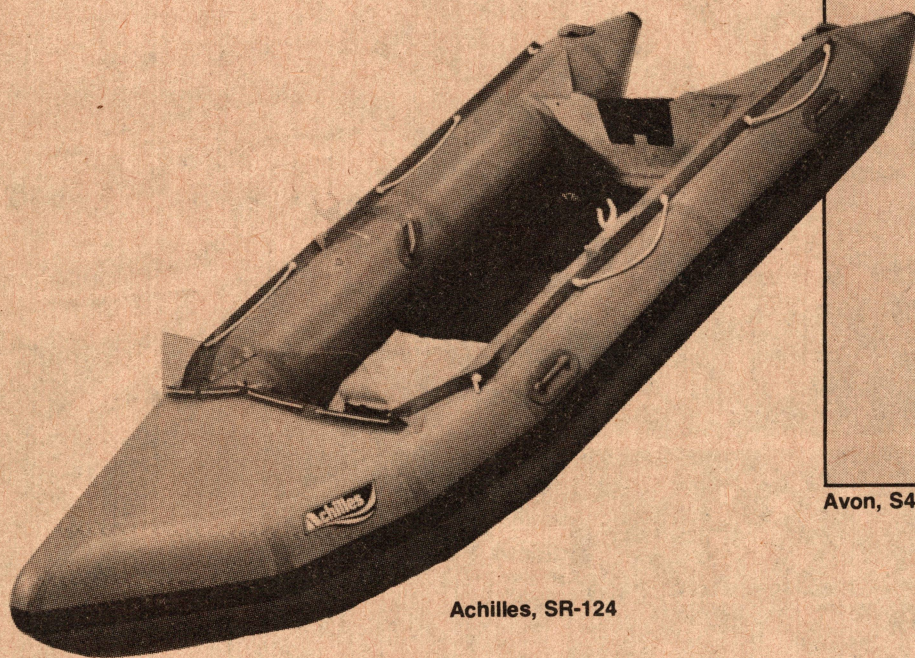
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FABULOUS Floatables

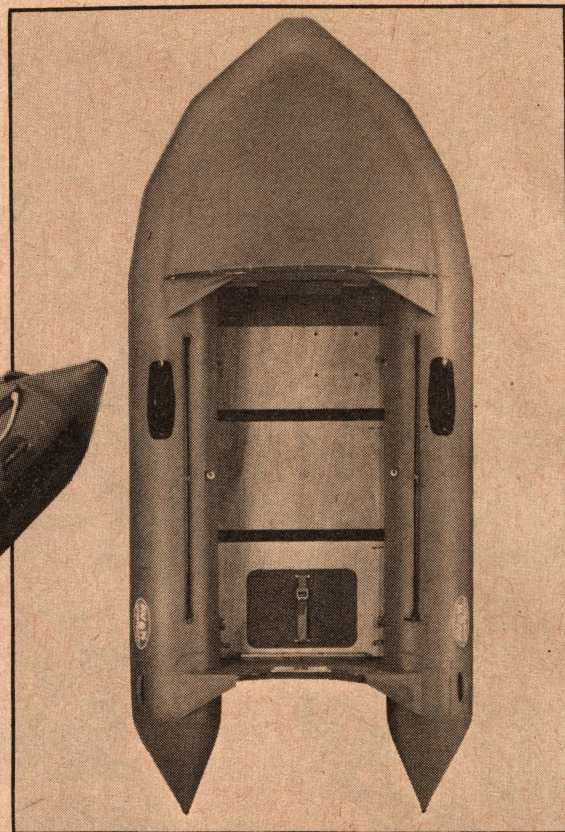
SDM rates the
expanding world of
inflatable boats
by Eric Hanauer



Fabulous Floatables



Achilles, SR-124



Avon, S4.00

An inflatable boat is a passport to dive adventure. For many it is the first step beyond beach diving to those special places where only a few can go. For some it is an alternative to crowded charter boats; an opportunity to share underwater experiences with a few close friends.

"You're not going to take that rubber raft out in the ocean, are you?" That question is still often heard as divers assemble their inflatables and prepare to launch. Divers were among the first to realize that inflatables are not rafts or beach toys, but safe, seaworthy, versatile boats which could transport them to otherwise inaccessible dive sites. They first learned about these boats by watching Cousteau use them in movies and on television; then experienced them first hand and were hooked.

Today's modern inflatables are as different from rubber rafts as a Porsche is from a Model T. The prototype was created in 1936 by a Frenchman, Pierre Debroutelle. His company marketed it under the name Zodiac. Europeans involved in boating were quick to accept them, and today some 85 percent of the boats registered in Europe are inflatables. The boats fit in with Continental lifestyles. Gasoline has always been ex-

pensive, people live in smaller houses or flats with limited storage space and docking slips are in short supply.

Inflatables caught on slower in the United States. After all, gasoline was 30 cents a gallon, you could buy a three bedroom home with a big garage for under \$30,000, and it looked as though these bargains were going to last forever. Bigger was better and we didn't need those funny looking rubber boats.

Today, Americans are thinking more European and suddenly inflatable boats seem to fit right in with the lifestyle of the 80's.

The prospective inflatable buyer is faced with a bewildering choice of sizes, configurations, brand names and price ranges. The purpose of this article is to examine the inflatable boat market, then discuss how to use and care for inflatables.

ADVANTAGES

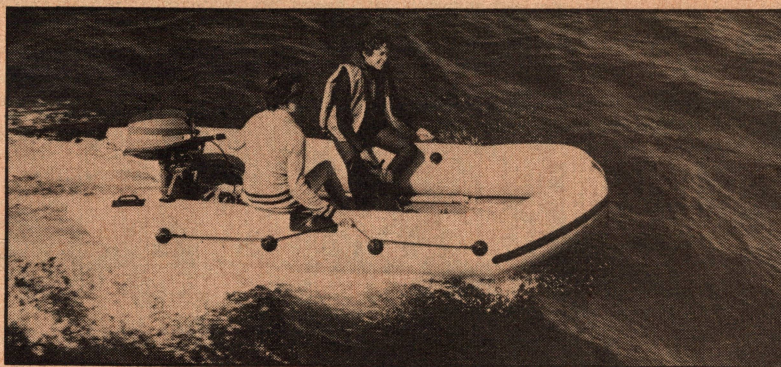
Enthusiastic owners never tire of talking about the many advantages of inflatable boats. They usually list the following attributes:

1. Safety. An inflatable is a strong, rugged boat. It is virtually impossible to capsize. Several manufacturers use advertising pictures of an entire crew standing

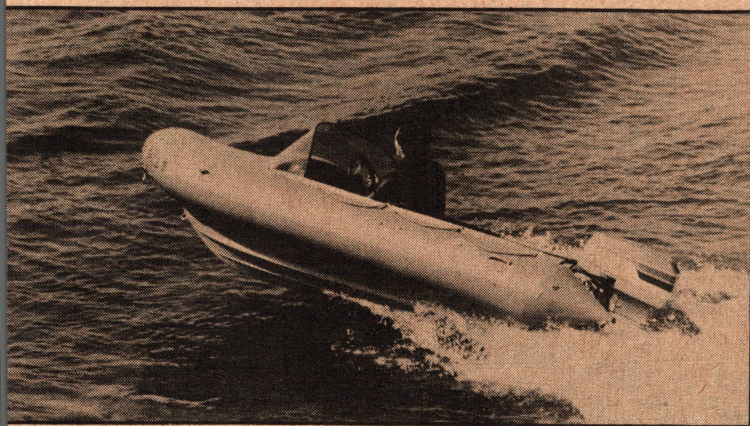
or sitting on the same pontoon, with plenty of freeboard remaining. The wide beam and buoyancy of the boat prevent it from tipping over. Furthermore, an inflatable will just bounce off many obstacles which would put a hole in the hull of a conventional craft. Most inflatables of a suitable size for diving have at least three air chambers. Even if one is punctured near the waterline enough air will be trapped above the puncture to minimize leakage and provide transportation home. In the unlikely event that one or two chambers collapse completely, the craft will still carry its entire payload on the remaining chamber, albeit wet and slowly.

2. Carrying capacity. Owing to the buoyancy provided by the pontoons, carrying capacity is that of a boat 25 percent larger. In other words, a 12 foot inflatable will carry the weight of a 15 foot rigid hulled boat. It will move that increased weight with a smaller engine because of its light weight, buoyancy and extremely shallow draft.

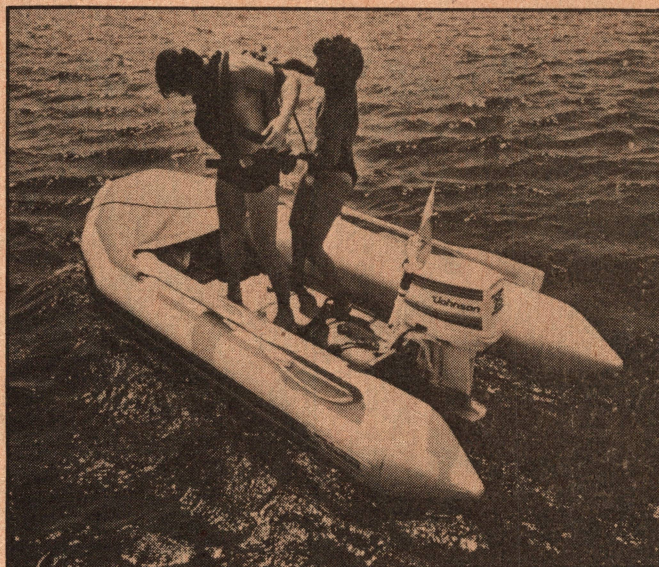
3. Low maintenance. Reinforced Hypalon coated fabric is virtually impervious to the elements. It can be left in the sun without fading, cracking or peeling. If it is left in the water and becomes encrusted with barnacles and marine or-



Barakuda, Weser II



Avon, SR4M



Boston Whaler, 13' Sport

ganisms, the hull can be cleaned with a nylon scrubber and will be as good as new. It should be, but does not have to be, washed after use in salt water. Only the wooden transom and floorboards and the valves require some care, and even that is minimal compared to a normal boat.

4. High resale value. Check the want ads for the price of used inflatable boats. An ordinary boat depreciates rapidly. High quality inflatables are in great demand. The rate of depreciation is low and a person selling a used one will recover a far greater percentage of the initial investment than the owner of any other type of boat.

5. Portability. A boat up to 14 feet in length is easily folded and reassembled by two people. It can be stored in the trunk of a car and driven to the launch site. A craft this size can also be carried on top of a car and, in turn, act as a car-top carrier for light objects. The larger inflatables must be trailered for most trips, but still have an advantage over normal boats. Since they are lighter, inflatables can be towed by a smaller car. Even a Volkswagen is capable of towing a 16 foot inflatable and its outboard motor on a trailer.

6. Compact storage. Our affluent so-

ciety has more boats and RV's than places to store them, especially with the trend toward smaller homes and condominiums. An inflatable can be hung in the rafters of the garage or, when disassembled, an average sized closet can be its home port.

DISADVANTAGES

An inflatable is basically a flat bottomed boat, which skims over the top of the waves. All flat bottom boats ride hard and inflatables, because of their light weight, are especially prone.

All flat bottom boats also run wet, and the inflatable's limited freeboard and cover make it run even wetter. This is less a problem with divers than other boaters, because divers will usually ride with their wetsuits on. A bowdodger and windshield will help, but won't completely alleviate the problem.

The width of the pontoons encroaches on floor space, limiting the room for dive gear and passengers. Since equipment must be stored inside the boat, passengers often end up sitting on the pontoons.

Finally, an inflatable boat of good quality isn't cheap. It will probably cost more than a conventional boat of comparable size. The prospective owner has to weigh

the added initial cost against the advantages mentioned earlier and come up with his/her own answer.

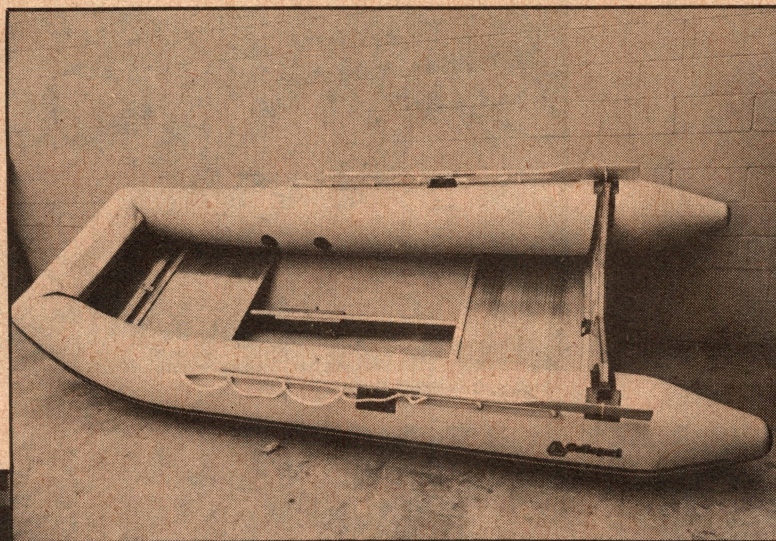
TYPES

Several types of inflatable boats are on the market, and only one or two are well suited for diving. Actually, you can dive from nearly any inflatable, but not every one is a dive boat.

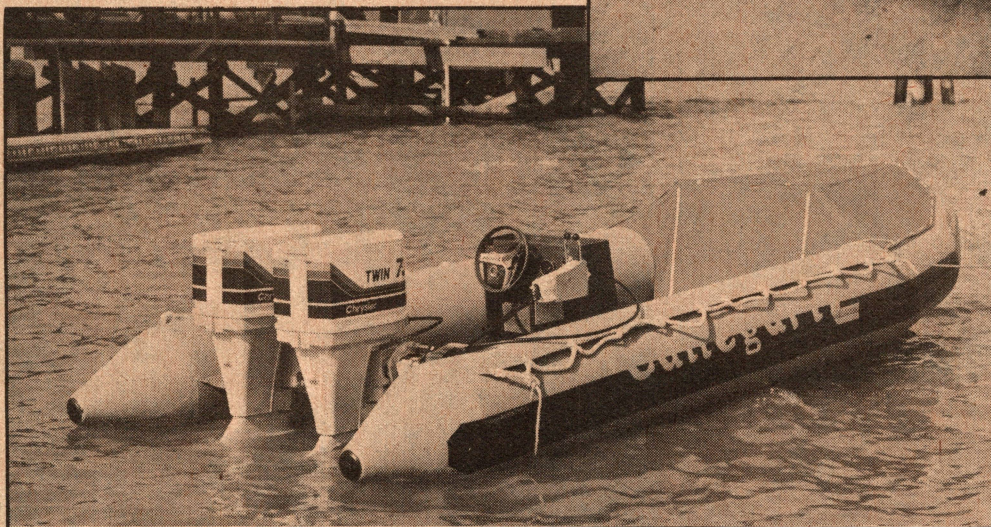
Dinghies are smaller, fabric floored boats primarily designed to act as shore boats for larger craft. The pontoons are O-shaped, most do not have floorboards, a keel, or a wooden transom. The small engine (up to 10 horsepower) it carries fits a tubular frame attached to the stern pontoon. These boats will not plane, and a diver will grow old waiting for this type of craft to carry him/her to the dive site. If necessary, one can dive from a dinghy used as a tender for a larger boat, but we will not consider it as a dive craft for the purposes of this article.

The vast majority of inflatables suitable for diving fall under the heading of sportboats. A sportboat has U-shaped pontoons with a wooden transom enclosing the open end, rigid floorboards, and a keel. The keel gives it directional stability. It is designed to be run by a more powerful engine (20 to 60 hp), and will

Fabulous Floatables



Callegari, Super Jumbo



Callegari, Albatros

plane with a normal load aboard. It is stable even in heavy seas which would render a conventional boat of the same size unsafe. These versatile boats are ideal for diving, water skiing, fishing or just fast cruising on and over the water.

Riverboats are oversized rubber rafts. They lack floorboards and are designed to bend and give in turbulent water and when colliding with obstacles. They come in large sizes and are designed for white water river runs.

Hybrid boats are relatively new on the inflatable scene. They have a fiberglass deep V-hull and inflatable pontoons. They are designed as high speed craft and do not provide the harsh ride of the flat bottomed sportboat. The Coast Guard uses hybrids extensively as rescue boats. The price one pays for the improved ride is threefold. Any deep V-hull requires more power to plane, so a larger engine is needed. Interior space and carrying capacity is sacrificed to the need for remote steering and seats. And finally, the craft cannot be folded.

CHOOSING AN INFLATABLE

A vast range of brands, configurations, and specifications greets the diver who is seeking an inflatable dive boat. It's just too much of a good thing. In this attempt

to guide the prospective buyer through the maze, the author had to make some difficult choices, and not everyone will agree. First, we must make some assumptions. The boat will be used for sport diving, as opposed to commercial applications. It will be used in large bodies of open water, oceans or large lakes. And finally, the inflatable will be used as the primary means of the diver's transportation, not as a support boat to a larger craft. Using these guidelines, we can cut the list down to a manageable size.

We have begun by eliminating dinghies. They lack the horsepower capability and the ride characteristics necessary in a craft to be used in oceans or large lakes. The same can be said of riverboats, although they, too, excel at their designated function.

Fiberglass hulled inflatables must be considered, although sacrifices are made in terms of usable space, compactness and portability.

This brings us to the sportboats, and we have eliminated those less than 12 feet in length. Those are primarily runabouts and light weight fishing boats and lack the carrying capacity necessary for diving.

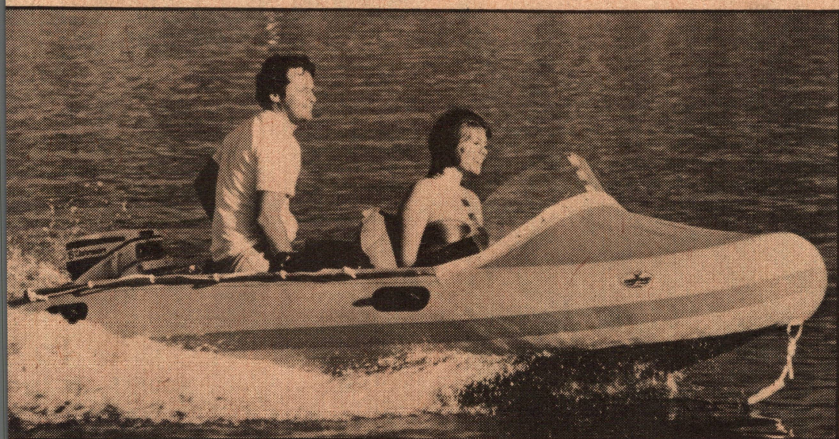
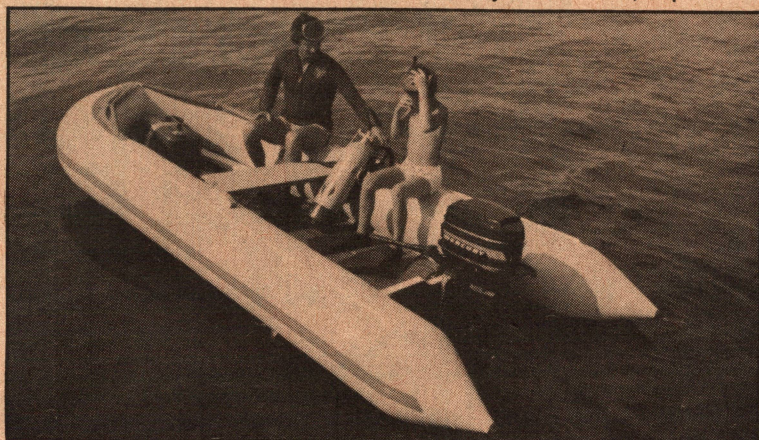
Divers have a bad habit of overloading

boats. The smaller tube diameters of inflatables under 12 feet fail to provide the safety margin needed to easily handle the extra pounds. Interior room is restricted, engine capacity is limited, and the smaller, lighter boats ride rougher. Although this type of craft could handle two divers in a small, confined body of water, or act as an auxiliary vessel for a larger boat, its use is too limited to be considered a true dive boat.

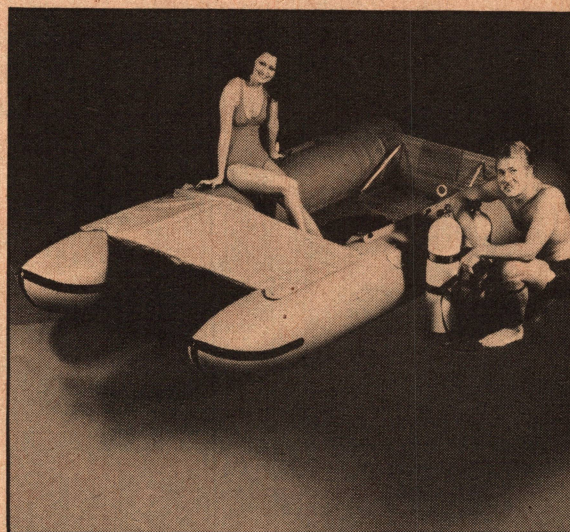
At the other end of the scale we will eliminate sportboats larger than 16 feet. At this length, portability and compactness are lost. A 17 foot boat will weigh well over 300 pounds without the motor, and a large engine will be needed to power it. On the other hand, a 16 footer will carry four divers in relative comfort, and will take six without straining its capabilities. Two people can handle all the components and set it up. Little will be gained by moving up to the larger craft. Therefore, we will consider boats larger than 16 feet beyond the range of the sport diver.

Fortunately, most manufacturers concentrate their sportboat line around the 12 to 16 foot sizes, so the diver still has an imposing array of choices confronting him. To begin with, let us split the range into two categories: the true inflatable

Explorer Boats, Meyer Industries, Explorer IV



Camp-Ways, Sea Wind



Inflatable Systems, BotaCat

and the fixed inflatable.

Twelve to 14 foot boats can be considered true inflatables. The hull weighs around 150 pounds, and it can be powered by a 25 horsepower engine, which weighs under 100 pounds. This boat is easily set up and handled by two persons; even one can do it if necessary. It is easily folded and stored, and roomy enough to accommodate up to four divers on trips of moderate length.

Fifteen and 16 footers can be considered fixed inflatables. Setting them up is a major effort, so they are usually stored in the inflated condition and are transported on trailers. The hull weighs well over 200 pounds and larger outboard motors, 40 horsepower and up, are needed to run them. They will carry up to six divers on trips more than 20 miles in open water.

MATERIALS

The fabric used can determine the quality and the price of an inflatable boat. The small rafts sold in department stores for use on the beach are made of unreinforced polyvinyl chloride (PVC). People in the industry refer to them as shower curtain boats. Yet Sevyor of France produces a quality PVC boat which has set a long distance river cruising record for in-

flatables. However, unreinforced fabrics tend to stretch, therefore cannot be pumped up to pressures higher than $\frac{3}{4}$ psi. This type of craft cannot take the beating divers will give it.

Reinforced fabrics are made of a synthetic base, usually nylon, although some manufacturers utilize the polyesters Dacron or Kevlar. Kevlar is the fabric used in bulletproof vests. The fabric is then coated with a synthetic rubber or plastic material to seal in the air and to protect the surface. Most manufacturers today use a combination of Neoprene and Hypalon. Neoprene is tough, abrasion resistant, seals and bonds well. However, if exposed to the elements for long periods of time, it will deteriorate. To prevent this, an outer coat of Hypalon is applied, or is mixed with the neoprene. Hypalon, a synthetic rubber product of the DuPont Company, is virtually indestructible. It is extremely resistant to ozone, sunlight, gasoline, ultra violet rays, smog and heat. According to Andrew Dossett, president of Seagull Marine, "You will never see a rotted Hypalon boat." He showed me a dinghy in his repair shop, the bottom covered with barnacles and marine growth. A nylon scrubber and a little bleach cleaned it with no scuffing of the fabric. The top of the pontoons, left

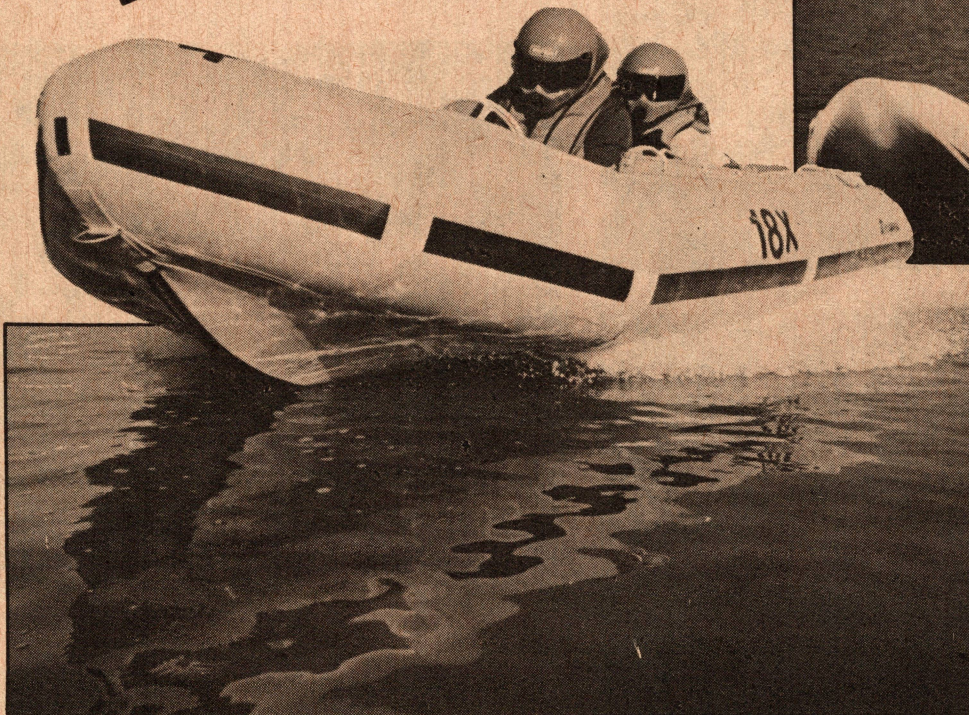
unprotected for many months, looked like new after a light application of Armor-all.

The process for applying Hypalon to the base fabric is similar to that used in the manufacture of tire cord. (It is no coincidence that some inflatables are made by tire companies: England's Avon, Germany's Metzeler, and Austria's Semperit.) This process is called calendaring. The nylon is passed through heavy rollers and the Hypalon is forced through the weave under pressure to form a homogenous mass.

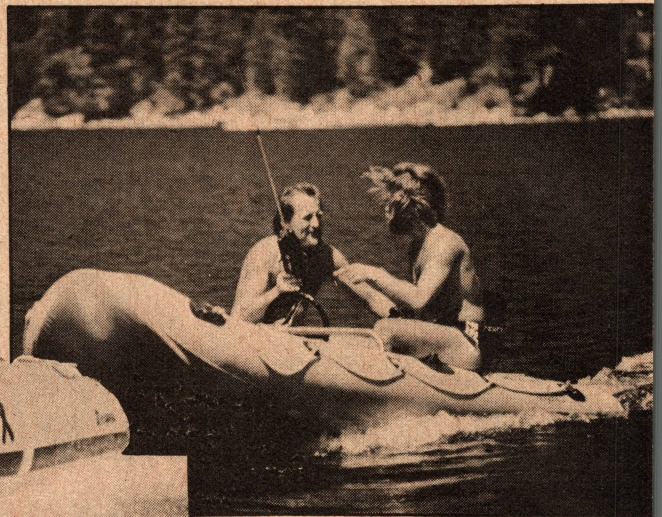
Some manufacturers use Hypalon only on the outside surface, reasoning that its atmosphere and chemical resistant qualities are most useful there. Some mix the material with Neoprene. Hypalon is a catchword in inflatable advertising, and everyone who uses it displays the name prominently. When choosing your boat, determine how the material is used in construction.

Some boats are made with reinforced PVC, and their manufacturers make strong cases for their products. It comes close to the strength of Hypalon in all aspects except resistance to high heat and strong solvents. PVC is easier to recoat when abraded, and is lower in initial cost.

Fabulous Floatables



Maravia, Tempest



Metzeler, Brigant S

CHAMBERS AND PONTOONS

Try to submerge a volleyball and you will get an idea of the buoyancy of an inflatable boat. Buoyancy is the key to its high payload, incredible stability and ability to stay afloat with plenty of freeboard even when the interior is completely full of water. The amount of air in the pontoons determines buoyancy. This is determined not only by the overall length of the boat, but also by the diameter of the tubes. Tube diameter is a trade-off. Larger diameter tubes provide more buoyancy and splash protection, but encroach on interior space. Unless the beam of the boat is increased to accommodate the wider tubes, valuable storage space is lost.

Sportboat tubes always project a considerable distance past the transom. The purpose is to counterbalance the weight and the thrust of the engine. Without the extended pontoons, the boat would be extremely stern heavy. A sudden application of power could result in a spectacular back somersault. Generally speaking, the more tube projecting behind the transom, the greater the horsepower capacity of the boat. However, tubes of greater diameter can also offset engine weight with increased buoyancy.

Air in the pontoons is carried in several

chambers. Most sportboats have three: One in the bow and one on each side. This is one of the key safety features of inflatable boats. If a puncture occurs and the air in one chamber is completely lost, the air in the remaining chambers is more than enough to keep the craft afloat and allow the crew to return safely home. As a matter of fact, many companies claim that their products will safely float on only one of the three chambers. Actually, a puncture at the waterline will result in the loss of pressure, but a lot of air will be trapped in the top of the tube. Going one step further, Novurania sales literature points out that even with all air drained from all chambers, the keel and floorboard provide enough structural stability to continue motoring, because the craft now becomes a displacement hull.

VALVES AND INFLATION

Several different valve designs are found in inflatable boats. Basically, a valve should handle a large volume of air, seal properly, and be corrosion resistant. No matter how careful you are, sand and salt will eventually work its way into the valve. Most can be disassembled and cleaned. With others, after first hosing it off thoroughly, put some liquid detergent into the valve and let it sit for a while to

break down the crud. Finally, go through a few brief inflation-deflation cycles to work out the foreign matter.

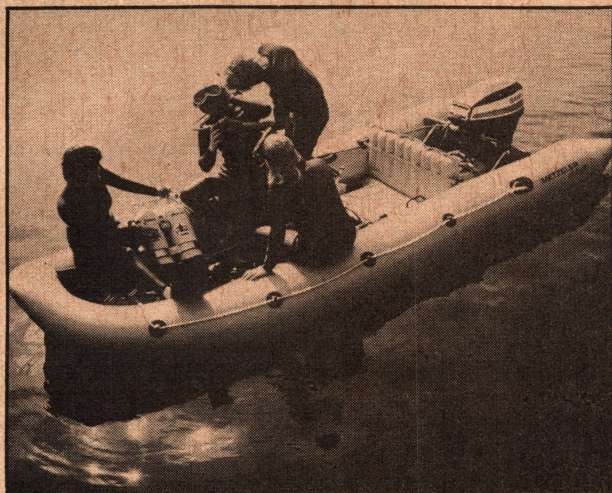
Zodiac features a patented valve design which allows filling or emptying all chambers through one valve. Each valve body has an extension going through the bulkhead, which can be opened or closed to interconnect the chambers. Color coded marks on the valve bodies show the proper valve position for filling and for running the craft.

The leading cause of poor performance in a sportboat is improper inflation. Many owners are afraid the craft will pop if too much air is put in it. Actually, a high quality inflatable boat can take twice the pressure the manufacturer recommends. And, it is virtually impossible to overinflate a boat using a foot pump.

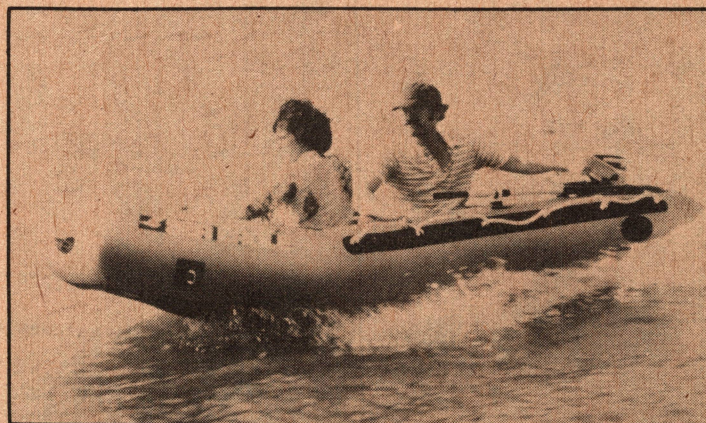
A properly inflated boat feels hard. Unlike a tire, however, it is designed to accept a large volume of air at a relatively low pressure. Recommended working pressure for most sportboats is around three psi. At this pressure, the pontoons are firm enough to securely lock the floorboards in position. They are stiff enough to resist "hogging," the tendency to bend like a sausage. When a boat is hogging, the propeller pushes itself under the transom, causing increased drag and poor



Novurania, Poseidon 5



Metzeler, Elefant



Sea Eagle, GT-10

performance. The floorboards in a soft boat slide back and forth, chafing the strips which join the floor fabric to the pontoons. Seagull Marine's Dossett states, "... about half the owners are waffling around in half inflated boats. If you don't fully inflate your Avon you might just as well buy a cheap raft ... that can only take soft pressure."

Inflating a boat by foot pump is a 10 to 15 minute operation. Small electric pumps that plug into a car's cigarette lighter can cut the time by two-thirds. They put in a large volume of air very quickly, but it will still have to be topped off with a foot pump because of the pumps' limited pressure capabilities. Impatient owners sometimes use service station hoses or scuba tanks to do the job. Both methods work, but caution is advised. Once the boat is hard, the pressure can quickly jump from a safe three pounds to an explosive 15 pounds or more. The proper way is to use the high pressure air merely for volume, leaving the pontoons soft. Then finish up with the foot pump. When you think you are finished, stand on the tube. It should support your weight without sagging. Check with a pressure gauge, available from most manufacturers. Remember, the air will cool once the boat is placed in the

water. Charles' Law takes effect, and the pressure drops. Put in some extra air if the boat is being inflated in the hot sun.

KEELS

Keel design is perhaps the leading factor that affects the ride and handling of an inflatable boat. Some companies use a wooden keel, some use an inflatable one. Each group claims its design is superior and a good case can be made for each. A keel enables the bow of the craft to bite into the swells for directional stability at speed. It counteracts the tendency of crosswinds to blow the boat off course. It also supports the floorboards and decreases drag by keeping the bow up.

Wooden keels generally handle better and give relatively smoother rides. The bottom forms a sharper V, allowing it to bite into the swell. The improved longitudinal stiffness also counteracts the tendency to hog. On the negative side, the wooden keel is heavier and harder to assemble. It usually comes in two pieces for compact storage, but this increases the number of brackets and screws. It adds stress to the bottom fabric and, over a period of time, can distort or tear it. Damage to the boat is more likely if a hard object is struck with a wooden keel

than an inflatable one.

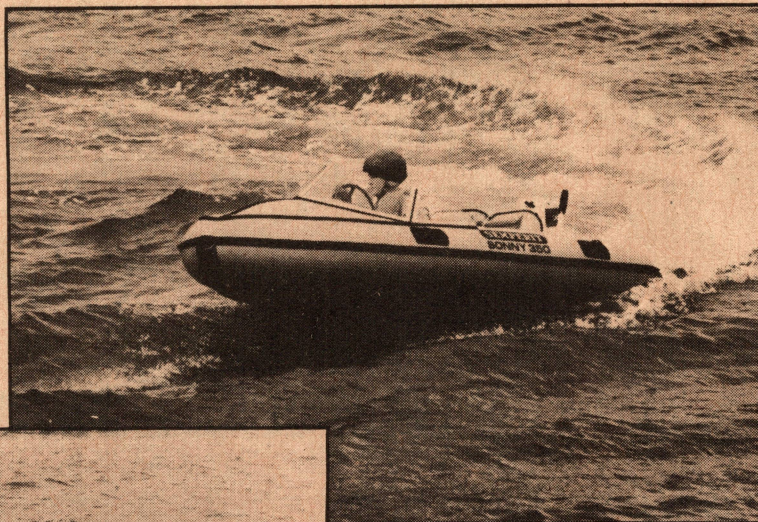
The inflatable keel has none of the above disadvantages, but has a more rounded bottom contour which doesn't bite as well. It tends to slide more on turns and bounce more in swells. So, the choice is between better handling/lower weight with less maintenance. You can't have both.

Three types of boats do not fit into the above categories. The hybrids, with their deep V configuration, track better than either type of inflatable with a flat bottom and a keel. The price is added weight and less resistance to damage if an object is struck. In addition, Semperit produces a boat which does not use a keel per se, but its floorboards form a V, giving it many characteristics of the hybrid's displacement hull. Finally, Inflatable Systems' Bota Cat features a catamaran hull design.

FLOORBOARDS AND TRANSOMS

Most floorboards are made of top quality marine plywood and are covered with shellac or marine varnish. They are the most abused component of an inflatable boat and the one requiring the most care. The clear finish looks beautiful when new, but every scratch shows. And when divers are on board, scratches and dings

Fabulous Floatables



Semperit, Sonny 350



Semperit, GTL-400

are inevitable. One way to forestall the inevitable is to cover the floorboards. Some companies offer a fitted expanded vinyl covering. Indoor-outdoor carpeting is cheaper, and can be cut to fit, but tends to slide around a lot. Avoid material with a foam rubber backing because it will disintegrate. At least once a year, or more often if unprotected, the floorboards should be sanded and recoated with a high grade marine varnish. Failure to do so could cause delamination or dry rot.

Zodiac offers aluminum floorboards which are a bit heavier and more expensive, but virtually invulnerable to abuse.

Floorboards are always a tight fit. The first time, you will swear the dealer gave you 13 foot floorboards for your 12 foot boat. Read the instructions carefully before assembling. Better yet, ask the dealer to show you how it's done. Then, according to Scott McIntosh of Port-a-Marine, "Assemble it first on your living room floor for practice. That's better than looking like a fool on the beach with your girlfriend and 100 people watching."

The transom must be sturdy, reinforced, and properly mounted. It should have a metal plate to accept the engine mounting screws. Some divers will drill an additional hole in the transom to ac-

cept an auxiliary mounting screw. One episode, when the engine shifted on its mount, with its propeller buzzing near the end of the pontoons, convinced me of the wisdom of such a move.

The area where the rear floorboard fits against the base of the transom gets a lot of chafe and wear, as does the fabric floor under the transom. This gets chafed when the boat is trailered or carried on top of a car. Both areas must be checked periodically and should be patched or resurfaced as needed.

If your boat isn't already equipped with a self bailer it can be installed by the owner at the base of the transom. A simple brass fitting with a plug can be used, or a one-way drain valve can be purchased. This way the plug can be left open, even when the boat is standing still.

ENGINE

It takes a lot less power to move an inflatable through the water, owing to its light weight and shallow draft. A smaller engine is lighter, easier to handle, and provides fuel economy with lower initial cost. A large, powerful motor will increase stress on the transom and floorboards. Since divers are usually more concerned with payload than top speed

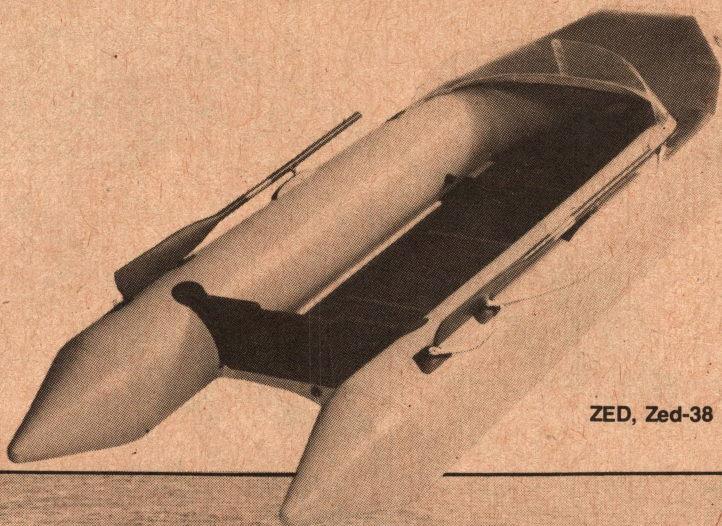
it is better to think small where engines are concerned. A 25hp engine weighs around 100 pounds, and is about the largest one a man can carry. It has enough power to plane a 12 to 14 foot boat unless it is grossly overloaded, and it doesn't stress the hull. Scubapro engineer Jim Dexter, an avid inflatable buff, says, "A 12 footer powered by a 25 should last forever." Get the smallest engine which will fit your needs and leave the big ones to the water skiers.

DIVING ACCESSORIES

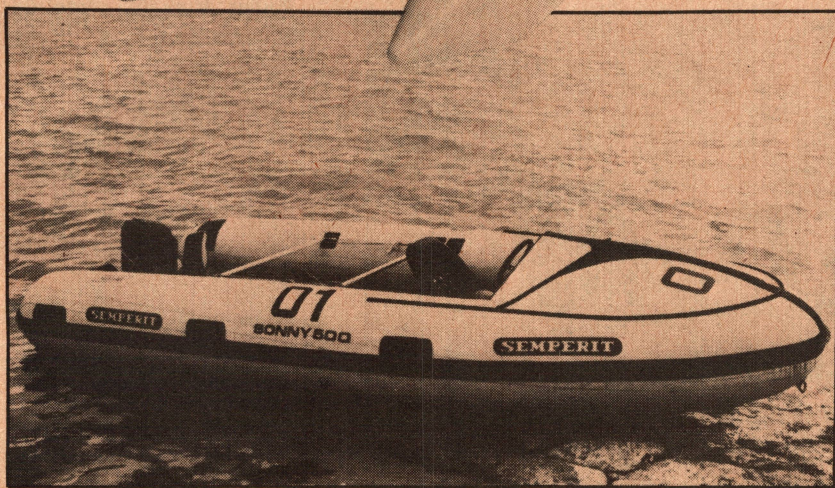
Having selected your boat and engine, it is now time to outfit it for diving. If any cash is left in your bank account, this should eliminate it!

First, you will need an anchor. Most owners prefer the Navy anchor with rounded flukes that will not harm the pontoons. A light Danforth with about 15 feet of chain will hold better, but the pointed flukes could be detrimental to the health of your Hypalon. The answer is to keep it all, anchor, chain, and line in a plastic bucket. The bucket should ride at the stern, where it is least likely to bounce and the driver can watch it.

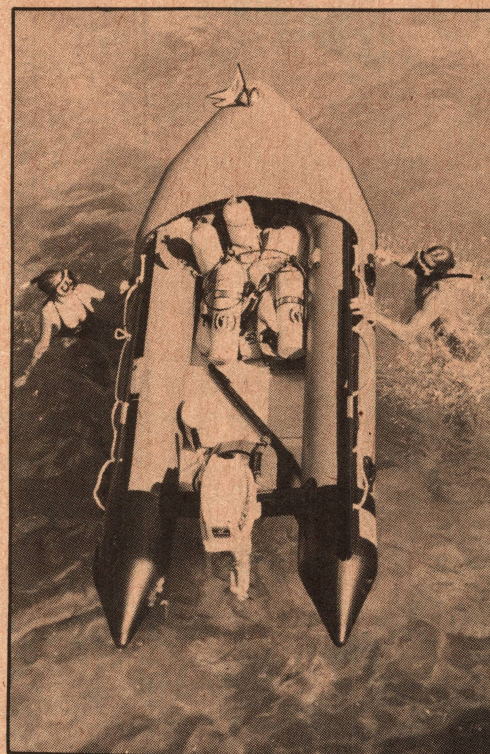
Many boats come with a bowdodger, or bow deck. Some are permanent, others removable. They provide a dry area



ZED, Zed-38



Semperit, Sonny 500



Zodiac, Mark II GT

up front, where properly protected equipment such as food, clothes, and cameras can be stored. It also prevents people from walking or dripping on the protected gear. And finally, it acts as a windbreak and spray shield when a plastic windscreen is mounted on it. Wind-screens are weak and break easily, but can help protect the crew from the elements.

Launching wheels are extremely helpful when the boat must be moved a long distance while assembled. One person can handle it because the motor counterbalances the weight of the boat. Wheels can even aid in launching through surf by allowing the engine to be lowered and started in shallow water, although a lot of help is needed to keep the bow into the waves. The best wheels are inflatable ones which float and have hubs that can be greased.

How about a bag of gasoline? It is possible to buy a flexible, reinforced synthetic rubber gas tank. Made with the technology that produced fuel cells in Grand Prix cars, these tanks are corrosion proof and won't damage the floorboards if they bounce. A 13 gallon tank takes no more space than a six gallon steel tank, and the fuel doesn't slosh because the tank collapses as it empties. It's expensive,

but should outlast two sets of steel tanks.

Personal flotation devices (PFD's) are required by the Coast Guard for all boats. Wetsuits and BC's don't count; they are not Coast Guard approved. Floating cushions can be used for boats less than 17 feet long, and one must be on board for each passenger. The cushions can double as seats or as floats for the current line while diving.

D-rings are valuable for attaching lines to hang various items overboard: game bags, cameras, pole spears, tanks, or mutinous crew members. Clip lines will hold them securely. A Bimini top will provide shade and keep your brain from boiling in the hot Baja sun. A battery-powered, portable depth finder will help you find those deep reefs. Waterproof pouches will keep clothes and charts dry. You will need battery powered running lights if you plan to be out after dark, and a good marine compass to find your way once you are out of sight of land.

THE INFLATABLE AS A DIVE BOAT

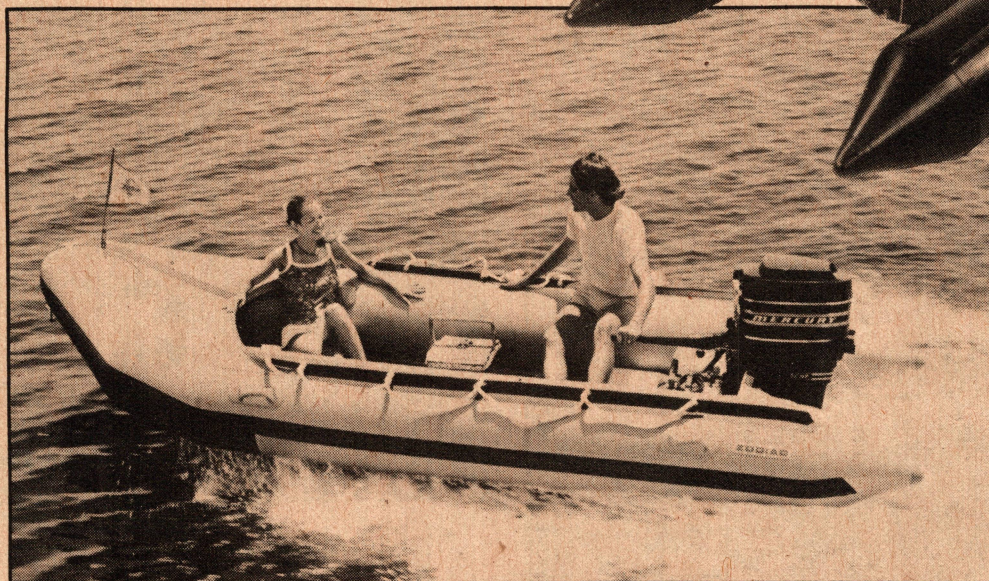
The keys to successful diving from an inflatable boat are planning and organization. Deck space is limited, and divers have never been noted to travel light. If you are going wreck diving, bring a rigid plastic box for sharp objects you might

salvage. Bring plastic buckets to hold game. Make sure spear tips are covered. If photography is your aim, bring camera lines on which to clip cameras at the dive site. Small plastic coolers will keep after-dive munchies intact and dry. Plan ahead.

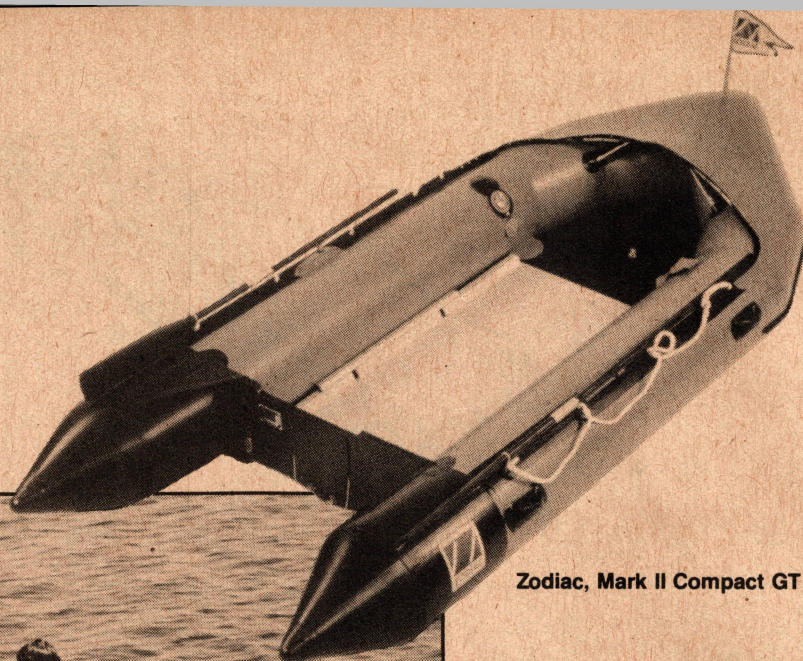
Assemble as much equipment as possible before loading the boat. Attach backpacks and regulators to the tanks. Suiting up in a small boat is a hassle, and rides are usually quite wet, so wetsuits should be put on before entering the boat. On a hot day, this might be restricted to wetsuit pants, boots and knife. All other equipment is stowed in a gear bag. No glass objects should be allowed on board.

It is best to load the boat from the center out, and tanks go in first. Some divers stand them up in tank racks. I prefer to lay them in the middle third of the boat, parallel to the transom. Be sure the valves are padded to protect from chafing, and attached BC's are protected. The anchor bucket and gas can go in the stern; gear bags and other light, soft equipment go forward. Two-thirds of the weight should be aft amidships. Passengers are used as adjustable weight to trim the craft for cushions atop the tanks, with their backs resting against the pontoons.

Fabulous Floatables



Zodiac, Mark II GR



Zodiac, Mark II Compact GT

planing. It is best to sit the passengers on

When the boat is crowded, passengers will have to sit on the pontoons. It can be an uncomfortable, bouncy ride. Give them something to hang on to, such as a line attached to a D-ring at floorboard level on the opposite side. Even so, a long trip is tough physically and psychologically. Take a break every 45 minutes on a long crossing to give aching backs a chance to recover. As veteran diver Ty Decker puts it, "The boats can take long trips, the people can't."

After arriving at the dive site and anchoring, clear as much deck space as possible. This is done by throwing the tanks overboard attached to a stern line, with BC's inflated. Back inflation units or buoyancy jackets make it relatively easy to put the tank unit on and remove it in the water, tremendously simplifying the gearing up operation. Cameras and spears are then hung over the side. With the decks relatively clear, divers can finish suiting up. Those using horsecollar BC's can put on their tanks in the boat after the others enter the water.

The back roll entry can be used from the pontoon, or the diver can merely turn, hang his/her feet over the side, and slip into the water. If a strong current is present, a long line should be attached to the

stern with a floating cushion at the end of it acting as a buoy.

Any boat dive should begin with a trip down the anchor line to check the hook. You want to be sure the anchor won't slip while you are diving and also ensure that it won't become fouled while you are trying to recover it after the dive.

Reentering the boat after diving is easy if the tank and weights are removed first. The weightbelt can be slipped into the boat, the tank securely hooked on the clip line. Thus unencumbered by some 60 extra pounds, it is easy for the diver to place both hands on the pontoon, flutter kick, and lift himself/herself aboard. Once your hips are over the gunwhale, just flop over, and you are in.

After everybody is aboard, fed, and the gear stowed, the tanks are brought on board. Game should be hung over the side in goodie bags until it's time to leave. Then it is placed in a bucket to keep the slime and smell off the carpet. Any shells brought aboard should be immediately placed in the bucket because broken bits have a way of ending up under the edge of the floorboards, to the detriment of the hull. Finally, before leaving, check to be sure all fragile equipment is well-padded, and placed out of harm's way.

TRANSPORTING AN INFLATABLE

Larger boats will have to be trailered on trips. The best trailers have boards which support the pontoons and the transom.

Pad all areas of possible chafe, especially under the transom. The boat will be more stable with the keel deflated. A trailered boat can carry more heavy gear than one transported on a car top, but don't overload it and make sure everything is wedged in so it won't shift. Lash it down securely, not only at the ends, but also the sides. It is best to tie each side independently, then pad any area where the rope may rub against the fabric.

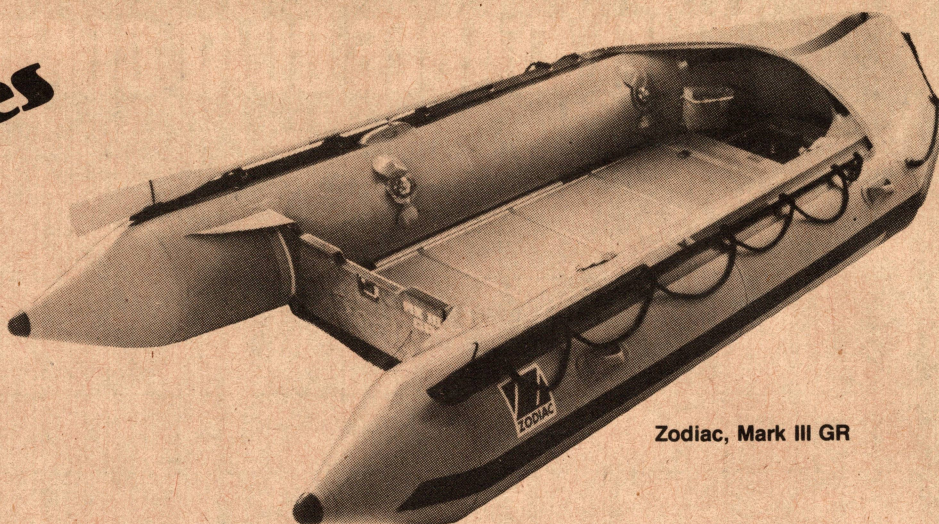
A 12 to 14 foot boat is usually easier to carry folded on long trips. However, if space is at a premium, the boat can ride on top of the car or van and act as a car top carrier for bulky objects, such as gear bags, gasoline cans, anchor bucket, and camping equipment. Everything mentioned in trailering applies here, plus a few more things. If the roof is too short to support the entire boat, let the bow hang over and make sure the transom is supported. Lash the bow tightly, but be sure the lashing doesn't interfere with the action of the windshield wipers.

Temperature variations will affect the pressure in the hull. When it cools, espe-

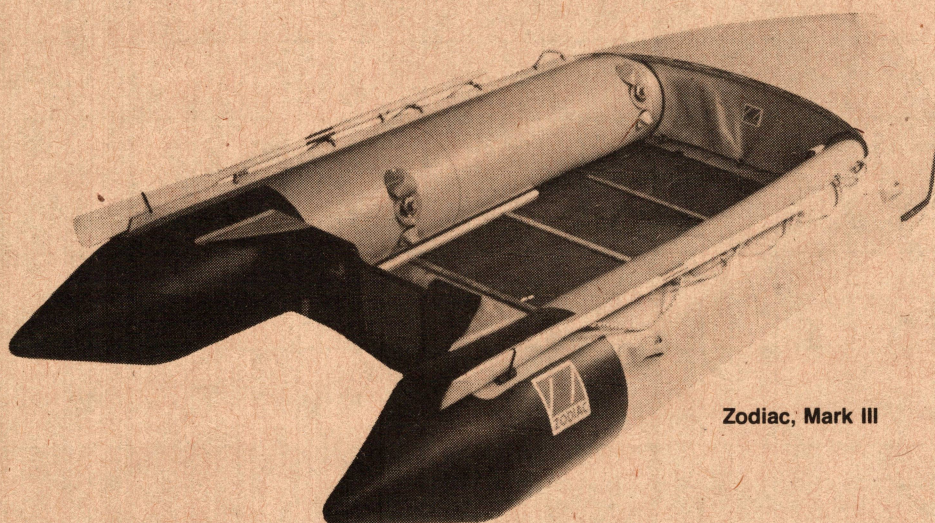
INFLATABLE BOAT COMPANIES

COMPANY	MATERIALS	KEEL	MODEL	LENGTH	BEAM	WEIGHT	PASSENGERS	PAYLOAD	MAXIMUM HP RECOMMENDED	PRICE
Achilles (Japan)	Nylon	Inflatable	SD 12	12'	5'1"	101	5	1100	25	\$1,245
	Neoprene		SD 124	12'4"	5'1"	117	5	1100	25	1,385
	Hypalon		SR 124	12'4"	5'1"	117	5	1100	25	1,445
Avon (England)	Nylon	Inflatable	Rover 3.80	12'5"	5'6"	145	6	1430	20	\$2,250
	Neoprene		S 4.00	13'	5'6"	171	6	1430	40	2,585
	Hypalon		S 4.60	15'	6'2"	237	8	2090	55	3,380
		Fiberglass	Searider SR 4M	13'4"	5'11"	283	4	1100	50	4,445
Barakuda (Germany)	Polyester Neoprene	Inflatable	Weser II.	12'	5'3"	125	5	1345	25	\$2,200
Bombard (France)	Polyester Neoprene Hypalon	Wood	B3	11'10"	5'1"	132	5	1213	25	\$2,350
			C3	11'10"	5'1"	132	5	1213	25	2,595
			B3 S	12'6"	5'7"	177	6	1431	40	2,350
			B4	14'5"	5'7"	209	6	1873	50	2,850
			C4	14'5"	5'7"	209	6	2655	50	3,100
			B5	15'5"	6'7"	248	7	2860	50	3,590
			C5	15'5"	6'7"	248	8	3638	70	3,995
Boston Whaler (USA)	Nylon PVC	Inflatable	BW 380S	12'6"	5'6"	132	6		25	\$1,680
Callegari (Italy)	Kevlar Neoprene Hypalon	Inflatable Wood	Super Airone	12'6"	5'	96	4	950	25	\$1,595
			Super Alcione	13'2"	5'9"	145	7	1330	40	1,995
			Nibblo	13'9"	5'10"	171	8	1550	50	2,150
			Albatros	15'11"	7'1"	273	10	3500	65	3,500
			Super Jumbo	13'3"	5'9"	165	7	N/A	30	1,899
Campways (Japan/USA)	Nylon Neoprene Hypalon	Inflatable	Sea Wind 12	12'	4'10"	88	4	1600	15	\$1,125
Explorer Meyer Industries (USA)	Polyester PVC	Inflatable	Explorer IV	14'8"	9'2"	170	6	1900	35	\$2,585
Inflatable Systems (USA)	Nylon Neoprene	None (Catamaran)	Bota Cat 12.0	11'10"	5'8"	85	6	1300	25	\$1,600
			Bota Cat 14.0	14'	6'8"	130	10	1950	40	2,100
Meravia (USA)	Polyester PVC	Wood	Tempest	13'2"	5'6"	160	6	1500	40	\$2,650
Metzeler (Germany)	Kevlar Neoprene Hypalon	Wood	Brigant S	12'10"	5'	135	4	990	25	\$1,888
			Elefani	14'8"	6'	211	5	1320	55	2,609
Mirage (Italy)	Nylon Neoprene Hypalon	Inflatable	Mirage 2	13'6"	5'6"	110	4	N/A	25	\$1,795
			Mirage 3	14'9"	6'4"	150	5	N/A	40	2,795
Novurania (Italy)	Polyester Neoprene Hypalon	Wood	Poseidon 3	12'4"	5'7"	182	8	1250	40	\$2,444
			Poseidon 4	14'3"	6'3"	226	8	1775	55	3,290
			Poseidon 5	16'	7'	338	10	2222	65	4,000
Sea Eagle	DynaWeb II	Inflatable	GT10	11'5"	4'9"	92	6	1300	20	\$1,800
Semperit (Austria)	Nylon Rubber Neoprene Hypalon	Wood V-hull	GTL 400	13'1"	5'9"	123	6	1540	50	\$2,400
			Sonny 350	12'2"	5'4"	132	5	1056	40	3,000
			Sonny 500	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zed (France)	Polyester PVC	Inflatable	38	12'6"	5'5"	144	6	1840	25	\$1,450
Zodiac (France)	Nylon Neoprene Hypalon	Inflatable	Mark II Compact	12'6"	5'6"	147	5	1320	40	\$2,418
			Mark II	13'10"	5'6"	170	6	1500	55	2,910
			Mark III	15'5"	6'4"	211	10	2400	65	3,737
			Mark II Compact GT	12'6"	5'6"	161	5	1320	40	2,764
			Mark II GT	13'10"	5'6"	165	6	1500	55	3,378
			Mark II GR	13'10"	5'6"	178	6	1500	55	3,650
			Mark III GR	15'5"	6'4"	247	10	2400	65	5,302

Fabulous Floatables



Zodiac, Mark III GR



Zodiac, Mark III

cially while traveling at night, air in the chambers will contract, causing the boat to become quite flabby. You will become aware of this when the lines go slack. To prevent the boat from shifting around on the car top, add air or tighten the lines. In very hot weather, internal pressure will increase and some air should be let out.

CARE AND REPAIR

The hull of an inflatable requires a minimum of care. Wash it after use and store it, either full or empty. If full, release a small amount of air to relieve stress on the seams. Wash and dry the floor mats — do not leave them in the boat. If the finish looks a bit dull, Armor-all will have it looking like new.

Every once in a while, remove the floorboards and wash out any sand or grit which might have worked its way underneath. At least once a year, refinish the floorboards with two coats of marine varnish. Small punctures are relatively easy to repair in the field. Buff the area to be

patched with fine grain sandpaper. Making sure it and the patch are dry, spread contact cement according to the manufacturer's instructions. Apply the patch, and let the glue set before any pressure is applied. Large tears can be temporarily patched, but it is best to have them professionally repaired when you get home. Patching a boat is an art and the pros can do it right.

A temporary fix, if you are out in the bush, should be sewn first. Use heavy rayon thread, not nylon because it stretches. The stretching will cause the seam to flex and eventually can tear the patch loose. Rayon fishing line is a good material for this purpose.

Monitor the major stress points in the boat. They are the V-doublers (strips which pad the seam where the floor joins the tubes) and the junction of the transom with the floor and the tubes. If thread starts to show through the fabric, recoat it. Neoprene cement works well. If the strips have been heavily chafed, remove them and replace with new ones.

Most inflatable boat designs are basically similar. The differences are subtle and lie primarily in materials and workmanship. Before buying a boat, learn as much as you can. Talk to divers who own inflatables, and go along on a dive if possible. Remember, divers demand more from a boat than does the average boat owner. Read evaluations in boating magazines, get catalogues; compare prices and specifications. A current book which covers the subject well is *The Complete Book of Inflatable Boats* by Don Hubbard (Western Marine Enterprises, Inc., Box Q, Ventura, CA 93002).

When you are ready to make the move, seek out a dealer with a full service department who knows the product and can stand behind the warranty. Consider the background and experience of the manufacturer and the availability of parts. Then buy the best quality boat you can afford. You will be assured of many hours of diving experiences in the only type of boat about which it *cannot* be said, "I don't own it, it owns me." 

Lying amid the maritime hustle and bustle of a major shipping center on the Delaware River is a small, highly specialized school which trains professional divers. Diver's Academy of the Eastern Seaboard, located within the sprawling South Jersey Port Complex in Camden, New Jersey, prepares men and women to enter the field of commercial diving. The school's location is uniquely suited to teaching professional diving. It is located right on the end of one of the Port's piers; the view from the classrooms is of freighters, tankers, barges and tugs.

Directly outside the main building which houses the classrooms, dark-rooms and administrative offices of Diver's Academy is the perfect, natural classroom for novice commercial divers. The murky waters of the Delaware River offer students training in conditions that mirror their future work sites. Low visibility is the rule rather than the exception in commercial diving, so students must be able to perform all skills in zero visibility.

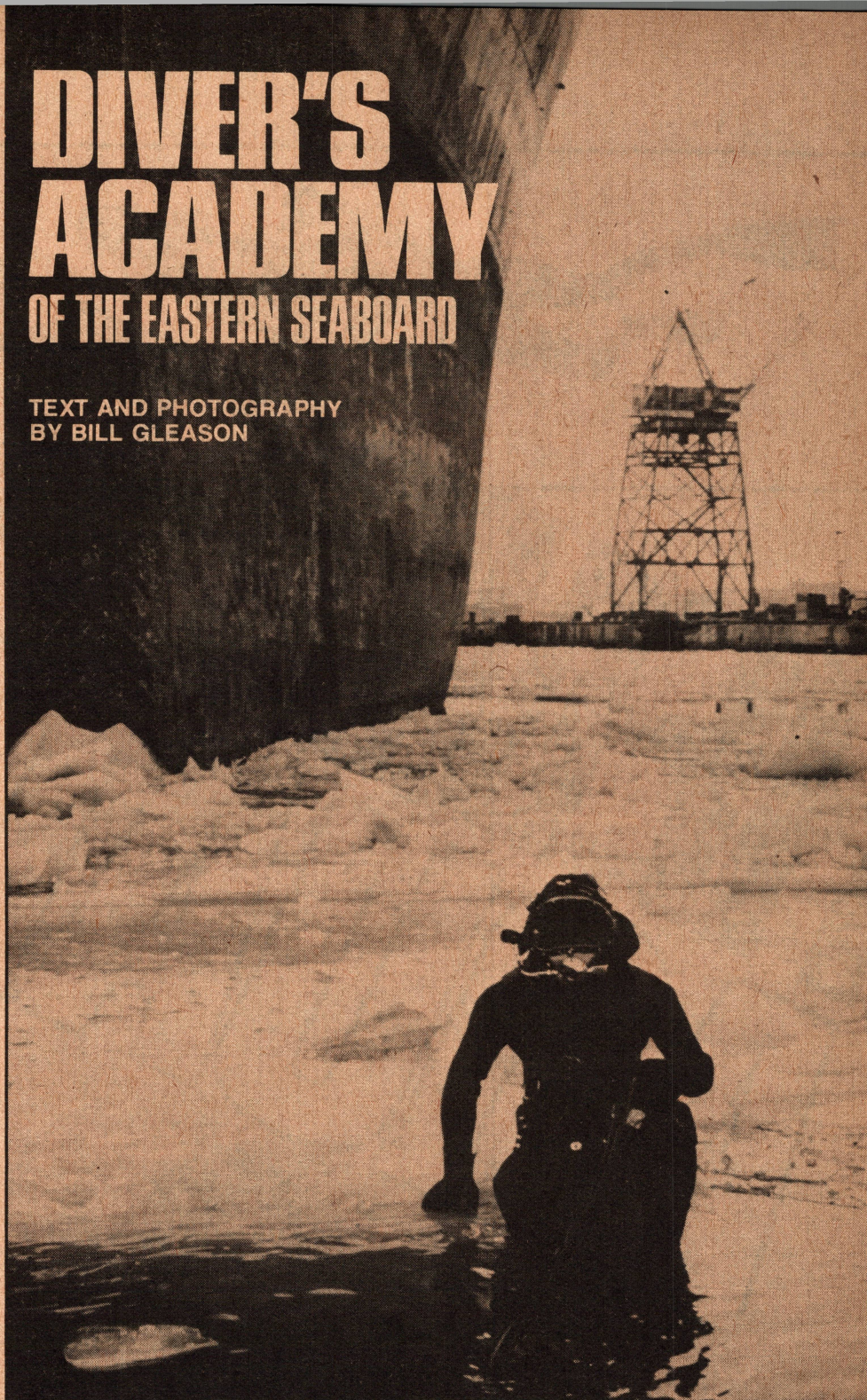
William Brown, the founder and director of Diver's Academy, had real life training in mind when he put through his first class of students over three years ago. When the Delaware property became available Brown knew it represented a chance for divers to be trained in a controlled, safe, environment that was identical to the conditions the divers would be working in. He built a large, multi-diver station working barge for his divers and tenders and moored it right outside the school. This gave his instructors and novice divers a working depth of 35-40 feet, and experience on one of the types of vessels that would become the diver's "office" of the future. The South Jersey Port also provides a few other benefits, enough scrap metal to turn a novice welder into an expert, and a selection of valve fittings to tax the dexterity of even a master commercial diver. The students practice with these and other tools first, on land, and later underwater, in order to increase their manual skills.

This is an extremely important stage of training for prospective commercial divers. Diver's Academy of the Eastern Seaboard trains students to enter the field of diving for a living. Once the training is over the student will begin as a tender (almost always in the case of the larger companies) or as a diver/tender on the more basic assignments. As you learn more and more about diving, actually being on platforms and jobs, you start to take over more and more dive responsibilities. But even after years of experience as tenders and divers, companies will still ask you the same question, "What can you do underwater that will help our company on this specific job?"

The answer could be as simple as inspection work in 20 feet of water. Or it

DIVER'S ACADEMY OF THE EASTERN SEABOARD

TEXT AND PHOTOGRAPHY
BY BILL GLEASON



Diver's Academy students train in conditions identical to those in which they will be working.

could require mixed gas, an engineering degree and take place hundreds of feet beneath the Gulf of Mexico or the North Sea. The value of any commercial diver is not only that he can work underwater, but the kinds of jobs he can perform there. Thus, the combination of a certified welding background with dive experience will put a person ahead of all other candidates when a welding job is needed. In the age of increasing technology in underwater applications, more and more specialists are required. Diving will get you to and from the job site;

your work skills and other dive experiences will determine whether or not you can complete certain tasks.

The geographic site of diving jobs is as varied as our coastline. Next to a willingness to learn, and a desire to succeed, the next critical factor in a diver's career is his ability to travel. The diver must be able to relocate as the demand for divers shifts. Harbor work, done locally and mostly on the north side of 80 feet of water usually encompasses routine maintenance, inspection, and repair

(Continued on Page 94)

HENDERSON AQUATICS

East Coast Dive Suit Company Surfaces With Hard Diving President

Text and Photography
by Geri Murphy



Allan Edmund, president

Henderson Aquatics was born in 1965 in a converted boat yard at Port Elizabeth, New Jersey. It was a tiny company that spent the better part of ten years struggling to keep its head above water while producing wetsuits on a limited distribution basis. It was so small that divers living in the Mid-West and on the West Coast hardly knew of its existence. In 1974, the Henderson factory burned to the ground in a major fire and its future appeared uncertain. It was at this precise moment of chaos and indecision that Allan Edmund, then 28 years old, stepped in to assume responsibility for the general management of this shaky little firm.

Allan's love affair with the sea started early in life. He began diving at 12 and

became a certified scuba diver at 15. He made his first dive in a Pennsylvania quarry and from then on spent practically every summer diving and fishing off the New Jersey shore.

While attending Vanderbilt University in Tennessee, Allan joined the swimming team just to stay close to the water. He graduated from college in 1969 with a degree in mechanical engineering. After graduation, Allan began work at a plastics extrusion company, but was soon recruited as a management trainee for a giant corporate conglomerate engaged in the manufacture of engine bearings, oil seals and pressure fittings. It was during his six year industrial internship that Allan sharpened his skills at equipment design and company management. After the fire at Port Elizabeth, Allan returned to his home state of New Jersey to take up the challenge of saving a foundering company.

During the past five years Allan has worked miracles at Henderson. He moved the factory from Port Elizabeth to the small industrial town of Millville, where there was a far better labor market. Next, he set about redesigning the product line and improving the company's manufacturing methods. Allan's flare for equipment design enabled him to invent and build specialized machinery for manufacturing wetsuits faster and better while keeping the price down. His goal was to produce quality dive suits at extremely competitive prices — prices any diver could afford. Under Allan's shrewd management, Henderson has flourished. Over the years he built the company into a sizeable manufacturing firm with 35 employees and a sales volume in the millions.

Perhaps one of the key factors in Henderson Aquatics' success is its unique approach to product development. It is not often you find the president of a company test diving its products every weekend, year after year.

Allan possesses an insatiable thirst for diving. He averages over 175 dives yearly, mostly on the wrecks offshore the New Jersey coast. He operates his own dive boat — an ultra fast 21 foot Mako powered by a 200hp Mercury outboard. With this speedy craft Allan and his companions can zip out to the wrecks in short order. His boat is equipped with the latest in electronic gear for locating wrecks, including dual track Loran C and a recording depth finder. Allan usually zeroes in on wrecks in depths to 120 feet, diving for lobster or hunting for unusual artifacts.

However, a good deal of Allan's dive time is devoted to testing his new suit

designs and production samples taken right off the rack. Conditions are ideal for dive suit testing — bottom temperatures in Jersey waters range from 45 to 50 degrees on a year-round basis. To Allan, these weekly forays to the offshore wrecks represent an opportunity for him to combine his first love with his weekly labor.

Testing his own suit designs has indeed opened Allan's mind to the realities of equipment function. The sea is a harsh environment. What started out as a great idea on the drawing board may sometimes turn into a meddlesome problem in the open sea.

Allan's program of weekly test dives has provided him with first hand experience without the usual bias of third party interpretation. He conducts a continuing program of test, modify, test, fix and test again. This round robin of weekly open water excursions has allowed him to speed the development of new designs, thus bringing the product to market remarkably fast.

Allan's pet project has been the development of an inexpensive drysuit for sport diving. His goal is to build a quality drysuit design for the same price as a wetsuit. He is convinced that drysuits may be the key to solving the diver drop-out problem in cold water regions of the U.S. "You cannot expect people to remain enthusiastic about this sport if they are freezing and uncomfortable," says Allan. His personal research on dive suit insulation indicates that a good drysuit is two to three times warmer than the best built custom wetsuit — especially at depths from 60 to 120 feet.

Allan set about tackling two major challenges simultaneously. First, build a drysuit that is both practical and comfortable for sport diving use and second, offer that drysuit at a price within the reach of the average sport diver.

Allan solved the first challenge by designing a form-fitting drysuit, snug in the

legs and boot area. The fit in the lower portion of the body is almost as tight as that of a wetsuit. This eliminates trapping large volumes of air in the suit. In addition, the tight fitting design allows more ease of movement and eliminates the cumbersome bulk normally associated with drysuits. Allan is 6'1" tall and weighs 195 pounds and he uses approximately 26 pounds of lead for neutral buoyancy when wearing this suit.

Allan solved the second challenge, price, by developing an inexpensive manufacturing method that eliminates much of the high cost of the labor needed for building and repeatedly testing an airtight suit. The Henderson suit is constructed of a special neoprene rubber with skin inside and nylon or lycra fabric on the outside. Because of the skin inside, this unique drysuit can be constructed quickly and easily. All internal seams are taped and bonded for airtight integrity. This approach to drysuit construction has helped to eliminate many intermediate labor steps and effected a huge savings in costs. Allan can now bring an inexpensive drysuit to the marketplace for a retail cost of approximately \$360 to \$400.

Allan has also developed a unique method for putting the Henderson drysuit on with amazing ease and speed. The suit is first turned inside out and then "peeled on" from the booties upward. The suit literally rolls on the diver with a minimum of hassle. A set of illustrated instructions are packed with every drysuit Henderson ships out the door.

Allan's most recent innovation was the introduction of the Lycra Drysuit (LDS), which combines fashion styling with the already proven design of the Henderson drysuit. The new LDS utilizes lycra in place of standard nylon for the exterior. Lycra comes in a variety of exciting fashion colors including: silver, royal blue, dark brown, or fire engine red. Lycra possesses a high reflective sheen which gives the LDS a very attractive and stylish look. Every LDS comes with an automatic SeaQuest inflator, Talon airtight zipper, attached hood and booties. The addition of the LDS has helped Henderson to broaden its line and provide the consumer with a wide range of drysuit products.

What does the future hold in store for Henderson Aquatics? Well, tight-lipped and soft spoken Allan Edmund isn't talking about his new product development project. But, he is still out off the New Jersey shore — every weekend — diving and testing those suits. I have a feeling you will be hearing and seeing a lot more from this little dive company in south New Jersey.



Technifacts

BY E.R. CROSS



Technifacts is designed to make sport divers aware of the many possibilities in underwater work for those who are properly equipped and trained. Many underwater tasks are within the scope of the skills of advanced divers. One such job involves use of power equipment for cleaning the underwater part of a ship's hull.

In the United States the principle organizations contracting for the services of divers to clean hulls are the military (primarily the U.S. Navy) and shipping companies that have tankers and other merchant vessels making regular, relatively long ocean voyages.

Unless a very special paint is used on a vessel it is estimated that frictional resistance owing to fouling will increase, in temperate waters, at a rate of one-fourth of a percent per day from the time a vessel leaves drydock. This means that a large, relatively slow moving vessel such as a tanker will, six months out of drydock, have an increase in fuel consumption (to overcome an increase in frictional resistance) of 40 to 50 percent to maintain a speed of 15 knots. Percentage of fuel consumption increase in higher speed vessels will be even greater. In addition to actual increased cost of fuel, other cost increases include extra wear and tear on engines and on the ship itself. With the cost of bi-annual drydocking, cleaning and repainting a major ship running about one-half million dollars, it is obvious that it pays to keep a vessel's hull clean rather than drydock the ship. The economical way to do this is to use hull cleaning machinery, most of which is diver operated.

Primarily, a ship's hull is fouled by an assemblage of marine animals and plants. Fouling occurs more rapidly in tropical waters than in temperate or cold waters. Also, fouling increases, both in rate and total amount, in the warmer seasons.

For convenience the fouled condition of a hull will be designated as Stage I through Stage IV with the least fouled condition being Stage I.

Stage I fouling appears and feels like a slime. The material fouling the ship

at this stage is primarily bacteria and diatoms. The slim film starts appearing on a vessel's hull very rapidly (within minutes) after undocking. This early growth serves as the primary attachment for other later forms of fouling.

Stage II fouling is algae, mistakenly called grass, from heavy slime stage to growths six to eight inches long. These are usually concentrated from the waterline of a vessel to a depth of about three feet but can develop on any part of the hull over a longer period of time.

Stage III fouling is by encrusting animals such as protozoa, sponges and coelenterates, with a few other forms such as barnacles, oysters and tubeworms.

Stage IV fouling is the result of a host of marine life forms attaching to and growing on the hull. In advanced stages of vessel fouling, a total of over 2000 species of life have been recorded, including mollusks, fish, hydroids, anemones and tunicates.

CLEANING A SHIP'S HULL

From the preceding it is obvious that it pays for a shipping company to keep the hulls of its vessels free from fouling. In most parts of the world individual divers or companies employing divers are engaged by ship owners to perform this service. It should be pointed out that hull cleaning appears deceptively easy but, in actual practice, it is sometimes difficult and can be potentially hazardous.

In any commercial diving (by an employee of a dive company) all rules and regulations of the Occupational Safety and Health Administration (OSHA), U.S. Department of Labor, must be complied with. A self employed diver need not, but should comply with OSHA regulations for the sake of safety. If a diver is not familiar with OSHA regulations, he should obtain the small booklet, *Questions and Answers About OSHA for Commercial Diving Operations* (OSHA 3036).

The following information on equipment, safety and cleaning techniques has been prepared with the help of Ira Allen, a commercial diver of Seaward Marine Service, Inc., Honolulu, Hawaii

and Duke Ogden, manager of Seaward in Hawaii.

HULL CLEANING EQUIPMENT

The design of hull cleaning machinery is such that it can be handled by either scuba equipped or bandmask equipped divers. The more recently developed light weight helmets can also be used in the free swimming mode. However, the degree of safety for the diver and success of the mission depends on the experience and capability of the diver with the equipment of choice. Bandmask and helmet gear is usually used, when available, for major cleaning jobs because of increased safety and the advantage of being able to communicate with the diver.

Full body protection is a must to prevent chaffing, cuts and scratches. (Also as a protection against the small stinging animals sometimes found on the hulls of ships.) With either scuba, bandmask or helmet equipment, a full wetsuit or drysuit, including gloves, is a must. The balance of equipment, mask (with scuba), flippers, etc., depends on the choice and experience of the diver.

With any type of equipment the diver should wear a return home or bail-out bottle of compressed air as an emergency source of breathing gas.

DIVE SAFETY

Test all dive equipment and hull cleaning machinery prior to entering the water. Personally be sure everything is diver operable before starting the job.

In addition to standard safety for commercial diving, the diver should be completely familiar with the kind of hull on which he is working. Since almost every kind of vessel may require cleaning sometime, the diver must be completely familiar with nearly all vessel types and sizes. Get a good book on vessel types and learn ship and shipping terminology. Know your ships before you start diving on them.

Prior to starting cleaning operations on a particular vessel, obtain a set of drawings of the water borne part of the vessel
(Continued on Page 98)

florida keys

dive guide



skin diver magazine
special supplement

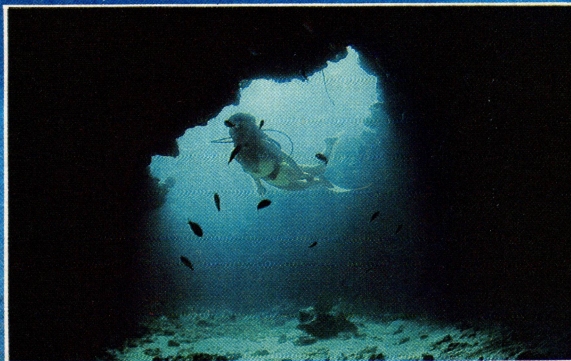
florida keys

the great

Diver and conch, Molasses Reef, Key Largo.



The Arch, in shallow water at Sombrero Reef, Marathon.



Divers explore French Reef Cave, Key Largo.

School of grunts at Davis Reef, Islamorada.



skin diver

American reef



Key Largo • Islamorada Marathon • Key West

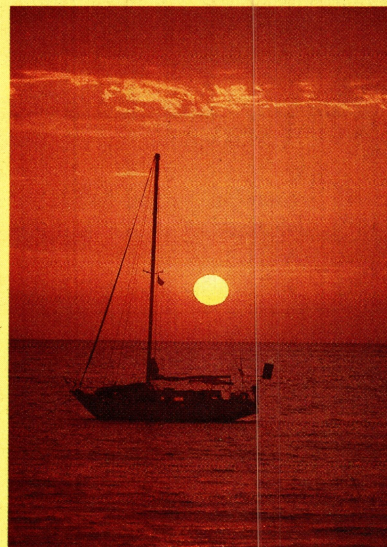
The Florida Keys are a chain of more than 200 low-lying islands or cays that were formed by ancient reef building or sedimentation processes during the last great Ice Age. Beginning just offshore Miami they run more or less continuously in a southerly direction gradually curving westerly until they end at Key West 180 miles away. The major reason for the popularity of the keys for divers is the clear water and true coral reefs on the edge of the Atlantic bank.

Offshore, a linear reef system with extensive patch reefs on the inside, follows the keys the entire distance. While not quite the great Barrier Reef, the reef system of the Florida Keys is an impressive geological formation unique to the continental U.S.

The second reason for the success of the keys is that they are the only tropical islands with living coral reefs that you can reach by car. From Jewfish Creek to Key West the island chain is connected by the longest overseas highway in the world, an amazing 108 mile span that links 31 islands with 40 bridges.

The third most important attraction is the unlimited support services that flourish in response to the large population of traveling divers. Dive shops are spotted more frequently than fast food chains and charter boats are only minutes away from any motel. Nowhere in the world, mile for mile, are there so many diver oriented services as there are in the keys. These include air, rentals, repairs, instruction, charters and guide services.

If you are driving through Florida, remember that some of the best stocked dive stores in the world are found a short distance from the highway. The Florida Keys are the mass merchandising model for diver tourism — the Sears and Roebuck for the scuba set. It's not Truk Lagoon, but is darn good coral reef diving with more bottom time for your bucks than anywhere in the tropics. And for the fish-watcher or marine life photographer, the Florida Keys hold their own with many of the more exotic dive locations of the Bahamas and Caribbean.



Sun sets over the ocean near Key West.

A DIVER'S PERSPECTIVE

The most important realization in preparing to dive the Florida Keys is that you are totally committed to boat diving. There are really no coral reefs or good dive spots that you can swim to from shore and therefore the very few sandy beaches in the keys do not provide any serious snorkeling or scuba diving. The water close to shore is usually too shallow and not very clear. With the large number of charter services available, finding a professional skipper with a well designed

Text and Photography by Rick Frehsee

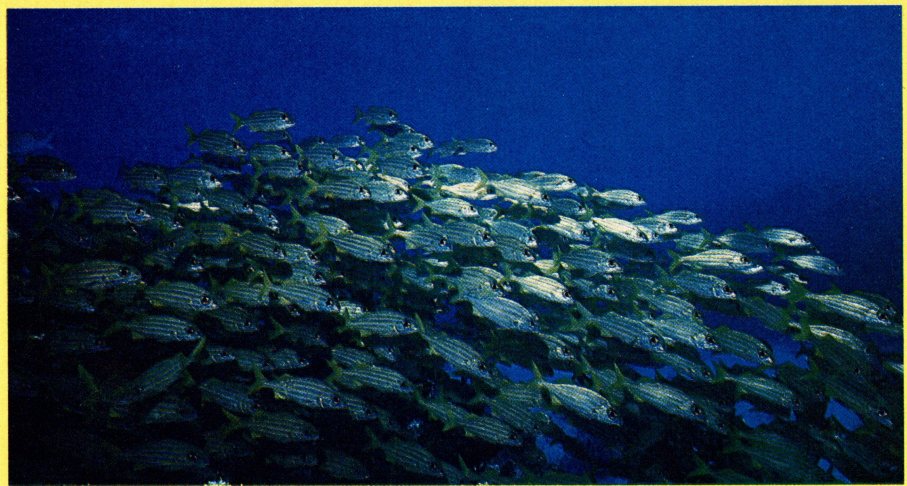
magazine special supplement

and properly maintained dive boat is no problem. Competition keeps prices fairly standard and the service is almost always excellent. Your choice of who to go with is based upon reputation, size of the boat, kind of dives you want and perhaps the personalities of the crew members. Most operations offer a morning and afternoon reef trip. Each trip features a two tank dive, usually at two separate reef locations.

For those seasoned keys divers who are experienced with boats, weather and local navigation, there are some boat rentals available. These are usually less than 20 feet in length. The offshore dive spots may be difficult to locate without a local guide. Keep in mind if you are out on your own that Florida law requires you to display a divers down flag anytime that you have a swimmer, snorkeler or diver in the water.

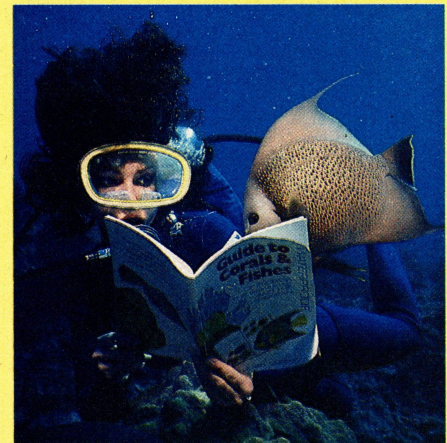
No one area of the Florida Keys has a monopoly on coral reefs or clear water. Each area has its favorite spots and which part of the keys offers the best diving is only a matter of opinion. It is logical to assume that some of the more prolific reefs are located offshore the larger islands which tend to protect the corals from the temperature extremes of the shallow Florida Bay. In a later section, I will identify some of my personal favorite dive sites.

Keep in mind that as the keys swing from south to west conditions can change within 100 miles due to a changing lee. For example, a strong wind from



School of French grunts at Davis Reef, Islamorada.

the north/northeast may have a greater effect on wave height and visibility in the upper keys than in the lower keys. For a heavy south wind, the opposite may be true. The prevailing winds in the keys are southeast in the summer and northeast in the winter. Anything less than 20 knots is fair game and produces tolerable sea conditions. While visibility is most often affected by the speed and direction of the wind, it is also influenced by tides, currents, plankton blooms and the position of the Gulfstream. In general, the clearest water is found at high tide on the outer reefs with light winds blowing onshore. Without offering further details, it is sufficient to say that the factors influencing visibility are complex and that if

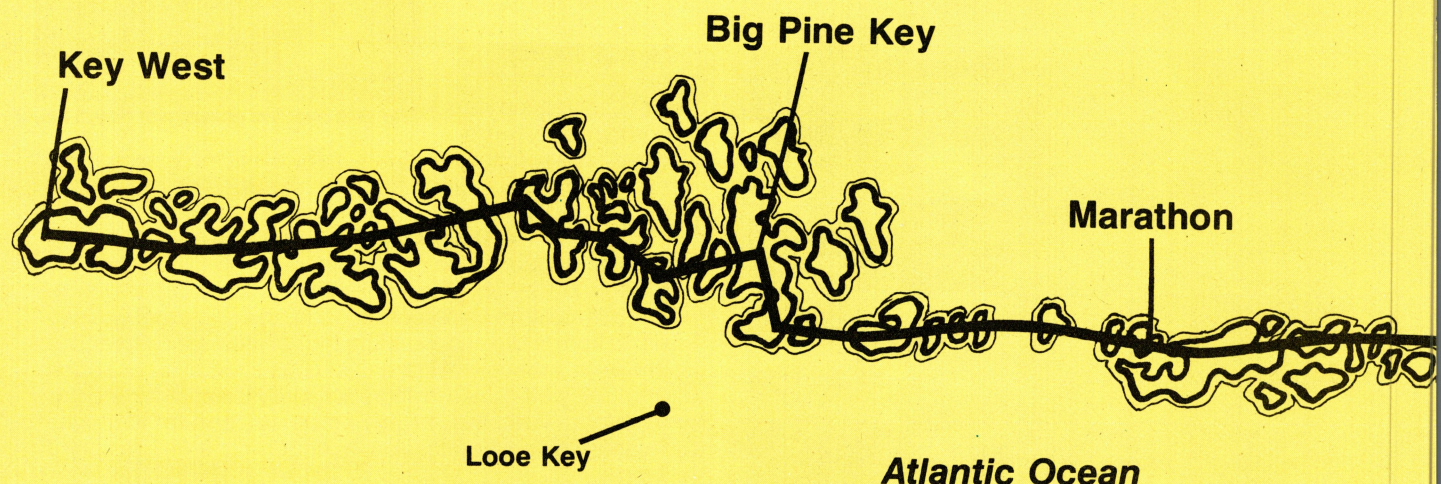


School for fish, Molasses Reef, Key Largo.

FROM MIAMI TO:

KEY LARGO — 58 MILES
ISLAMORADA — 76 MILES
MARATHON — 111 MILES
KEY WEST — 159 MILES

Gulf of Mexico



you're looking for the clearest water, leave the selection of dive site up to the skipper. His local knowledge, combined with marine radio communication with other dive charter boats will identify the best spot to dive.

The most dependable dive conditions are found from May through September. The winds are more likely to be low and the visibility high. This is just a rule of thumb, however, as tides and currents are localized and afternoon thunder showers are a possible consideration. The worst months are probably January through March, although some of my favorite days are just after a cold front passes when the seas calm down completely, the Gulfstream has moved in over the reefs and there's not a cloud in the sky. Most divers wear at least a wet-suit jacket in the winter. Winter water temperatures may get as low as 68°F, in the summer water temperature stays around 80°F.

The best diving month with the least amount of people is September. The busiest weekends are around Christmas, Easter, the Fourth of July and Labor Day.

Probably the most fascinating attraction of the keys coral reefs is the abundance of fish life. Schooling fish in particular are very numerous. It is not hard to find chubs, snappers, grunts, porkfish, goatfish and spadefish in large numbers.

The only true environmental hazard in the keys, other than venturing outside in very rough seas, would be the tidal currents or the Gulfstream current. They can

be unpredictable and at times approach a speed of two knots over the reefs. Fire coral and sea urchins are about the only menacing creatures of any concern. Watch out for jellyfish or man-o-war in the winter.

For the purpose of classification, it is convenient to divide the Florida Keys into four areas. This division is made on the basis of geography and commerce rather than with regard to dive areas. There is a good deal of overlap, with many reefs being visited by dive boats from more than one area depending on schedule, and size and speed of the boat. Of the hundreds of dive spots throughout the keys, the list of recommended spots is based on popularity, convenience and personal favorites.

KEY LARGO AND PENNEKAMP PARK

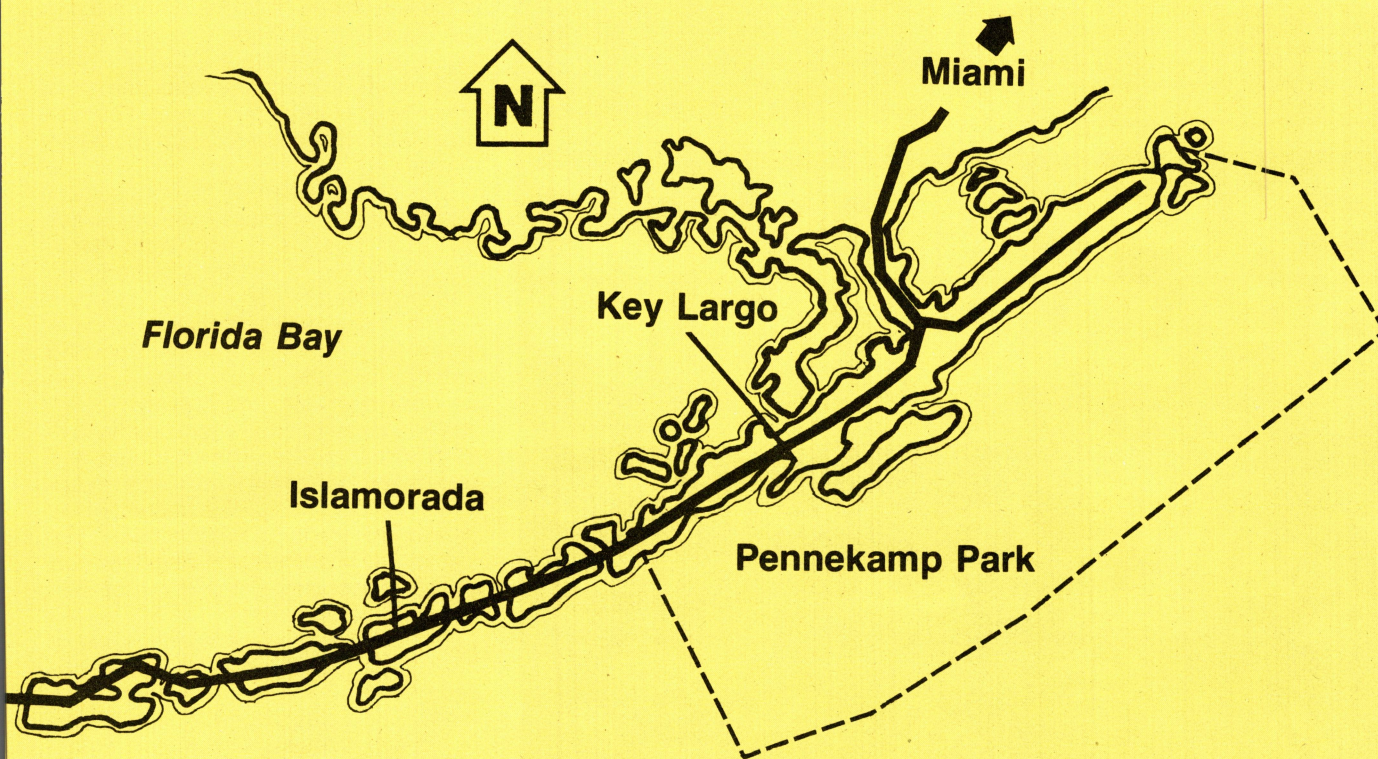
Key Largo is the first major island after you leave the mainland and one of the most attractive to divers. Presently, there are about 20 dive boats working out of Key Largo and most trips are run to reefs and wrecks inside Pennekamp Park. The park, which is 22 miles long and six miles wide, has been protected from coral collectors, spearfishermen and tropical fish collectors since it was declared a National Monument a little more than 20 years ago. This has permitted the marine life to become fairly comfortable with the presence of divers and as a result, many of the better known reefs in Pennekamp are fantastic for fishwatching and photography. There are camping facilities at the

park headquarters and Steve Frink's photo service offers daily Ektachrome processing and an excellent selection of rental photo gear.

Eight miles northeast of Key Largo's north cut, on the outside edge of the park, is Carysfort reef, well marked by a 100 foot steel tower lighthouse, the first erected in the keys. Of the better dive areas in the park, Carysfort is one of the least crowded due to its distance from most of the operators. Carysfort offers excellent snorkeling just south of the tower with acres of elkhorn coral in 2-20 feet of water. Several years ago, American Dive Headquarters showed me a deep reef a few hundred yards northeast of the tower that is quite spectacular. In 45 feet of water a beautiful cascading slope of staghorn coral, with schools of porkfish, gradually gives way to a flat sandy bottom at about 80 feet. Large grouper and hogfish are common and during the spring, large turtles are frequently seen.

The Elbow is an interesting area, marked by a 36 foot light tower in the middle and toward the outside of the park. Fifty yards east, southeast of the tower, is an extensive elkhorn reef in shallow water suitable for snorkeling or scuba. All around the Elbow are the broken remains of several shipwrecks. Depths are 6-25 feet.

Christ of the Abyss is located six miles east, northeast of Key Largo's south cut in 20 feet of water. This famous statue weighs 4000 pounds and is 11 feet tall; a





Capt. Slate's

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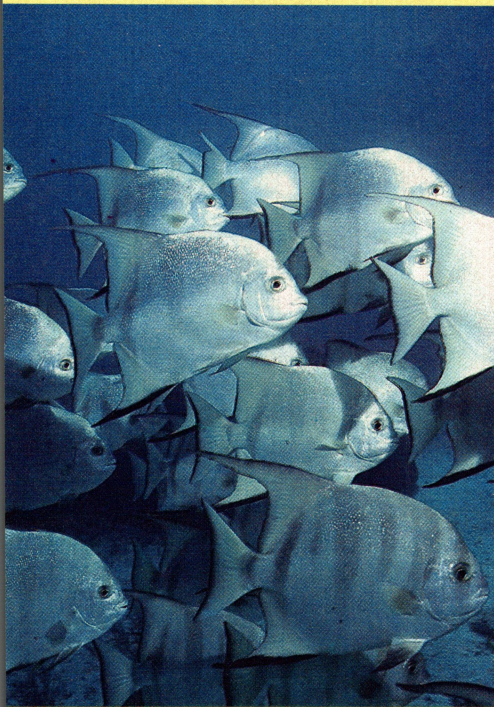
duplicate of statue in the Mediterranean sea near Genoa, Italy. Pennekamp's statue was a gift from Egidio Cressi, the Italian dive manufacturer, and is a great subject for underwater photos. Unfortunately, the area around the statue is quite shallow and the visibility is not always the best. It's also a good distance from the statue to the better reefs in the park.

Located a mile south, southwest of the statue is Grecian Rocks, one of the best sea gardens in the park and a perfect spot for snorkelers. The reef is approximately one-half mile long and 100 yards wide and is partly awash at low tide. There are impressive formations of elkhorn, staghorn, star and brain corals and a wide selection of tropical fish. During rough weather, the inside of the reef provides a protected area but the shallow depths are not appropriate for scuba.

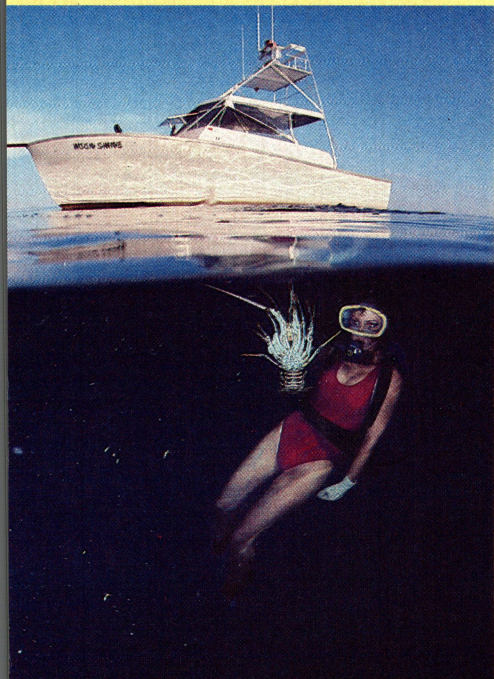
French Reef is an extensive area which is one of the best dives in all the keys. It is located four and one-half miles south, southeast of the south cut of Key Largo and is marked by a black stake. There are at least a dozen different dives on French and about that many different kinds of reef environment. In shallow water, there are extensive elkhorn ridges and lots of tropical fish. In 30-40 feet of water are canyons, ledges, caves and overhangs. There are at least three cave systems which are really large, hollow coral heads. The best cave for photos is probably Christmas tree cave which is oftentimes filled with copper sweepers. In 45-50 feet of water is an area of extensive heads which look like similar depths in the Caribbean. T.J. Holub aboard the *Sea Dweller II* showed me extensive 80 foot reefs off French and Capt. Frank aboard the *Divemaster* took me to a dense reef in 120 feet of water. You can dive French many times before you begin to see it all.

One and one-half miles northeast of French Reef is the most popular wreck dive in all the keys. During World War II, the *MV Benwood*, a 300 foot freighter, was torpedoed off the Florida Keys by a German submarine and sunk in her present location. She was used for bombing practice for some period of time and her bow has been dynamited away. Today, she is a maze of steel wreckage lying in 25 to 50 feet of water. The most intact and photogenic part of the wreck is her deeper aft section. The major attraction of the *Benwood* is the large number of fish that take refuge in her remains. The *Benwood* is also a popular night dive for the Key Largo operators.

Probably the most popular dive site in the Key Largo area is Molasses Reef, one and one-half miles south of French Reef. While not quite as extensive or as diverse as French, Molasses features tremendous schools of fish and the best average visibility. It is also a well developed reef for fish feeding and there are a few local angelfish that will try to climb in your BC pocket to find a hidden snack. Don't



Spadefish at French Reef, Key Largo.



Boat, diver and lobster, Islamorada.

let it shake you if you find a green or a spotted moray swimming out of the reef to greet you. They are also local pets. There are many different dives on Molasses including the *Winch* wreck, Crawford's Ridge and hole-in-the wall. A better area for fish photography is hard to find.

The area known as the Upper Keys includes Plantation Key, Windley Key, Upper and Lower Matecumbe and the community of Islamorada. Dive experiences range from lovely snorkeling spots to some of the best deeper dives in the keys. This is also an area where several old wrecks from the Spanish treasure fleets can be seen. However, the hulls have long since disintegrated and piles

DIVING THE KEYS?

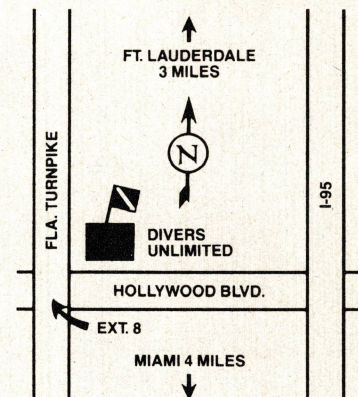


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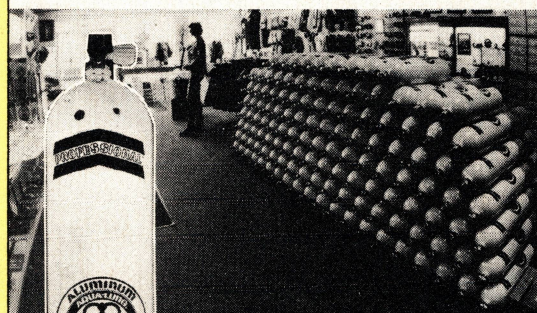


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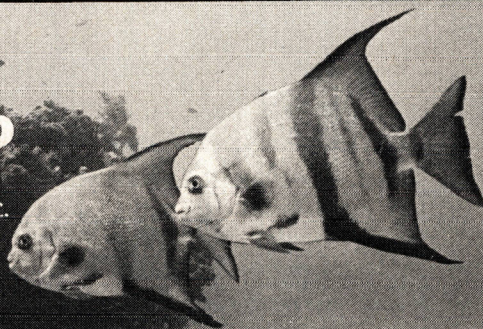
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of ballast stone are often the only visible clues to their location. There are good dive services throughout the Upper Keys but they are not as concentrated as in Key Largo. One landmark worth visiting is the Holiday Isle Resort, a sprawling complex which includes a hotel, marina, dive shop, several lounges and snack bars, gift shops and charter boat docks. This is also where you find the Tiki Bar, a rustic outdoor watering hole which is a popular meeting spot for divers.

Eight miles out of Windley Key is a high relief area with numerous coral formations known as Conch Reef. A relatively rare stand of pillar coral can be found in shallow water and there is also some very good diving a short distance to the outside in 45-60 feet of water. Conch is also a popular spot for many Key Largo operators.

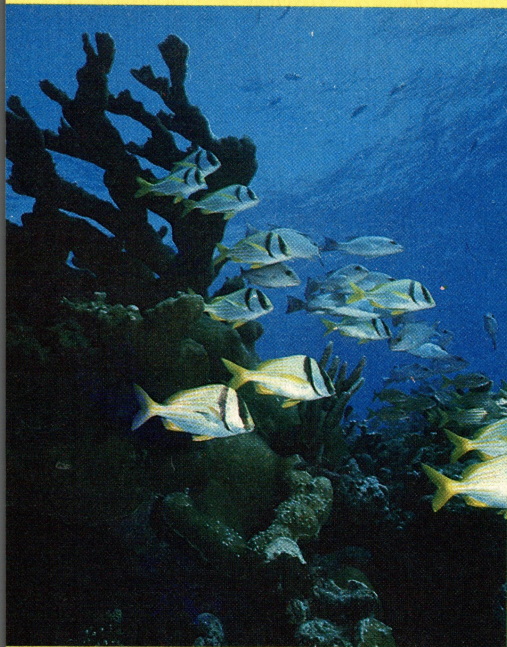
Recently, I was taken to Davis Reef by Captain Mike Fitz aboard the 36 foot *Moonshine* from the Holiday Isle Marina. Davis is an outer reef located three miles east, southeast of Hen and Chickens and is unrivaled for its enormous schools of fish. Hundreds of yellow goatfish and striped grunts move across the bottom in unison, creating a majestic flowering pattern which is a visual treat for fish watchers and photographers. The best section of Davis, where the large schools of fish are found, is actually a small area and it might be a good idea to grant the right-of-way to a dive boat at anchor and select an alternate site.

Crocker Reef, located five and one-half miles southeast of Windley Key, is one of the best outside reefs in the area. It is a large area of sprawling staghorn formation with depths of 35-90 feet. Just south of Crocker, there is an almost vertical drop-off in 55-60 feet of water which usually produces an interesting encounter with pelagic fish like amberjacks and mackerel. There's no guarantee, but I have seen 300 pound plus jewfish on deep Crocker more than once.

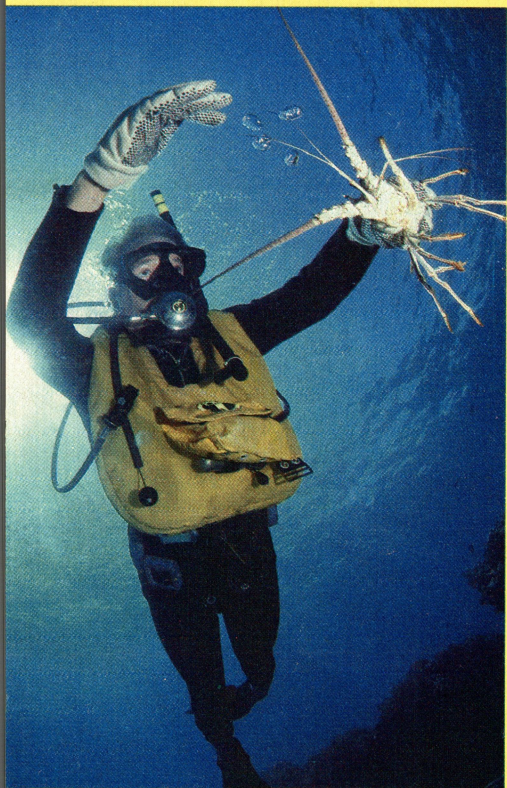
Only three miles east, southeast of Windley Key is one of the heaviest inside reefs in all the keys. Hen and Chickens used to be one of the prettiest too, but unfortunately, it was devastated about 10 years ago by a rare lingering cold snap and it is still recovering. The mountainous star and brain corals here, some of which are 12 feet tall, are unusual for a reef so close to shore. Because of its location, however, visibility is quite variable. There are almost always a few really large barracuda that hang out here. If the water is clear, it is an interesting dive despite the bleached appearance of many of the coral heads.

Islamorada coral gardens are actually two separate areas inside and to the south of Hen and Chickens which are lovely snorkeling spots with a wide variety of hard and soft corals. Visibility is quite variable.

Located six and one-half miles south, southwest of Windley Key and marked by

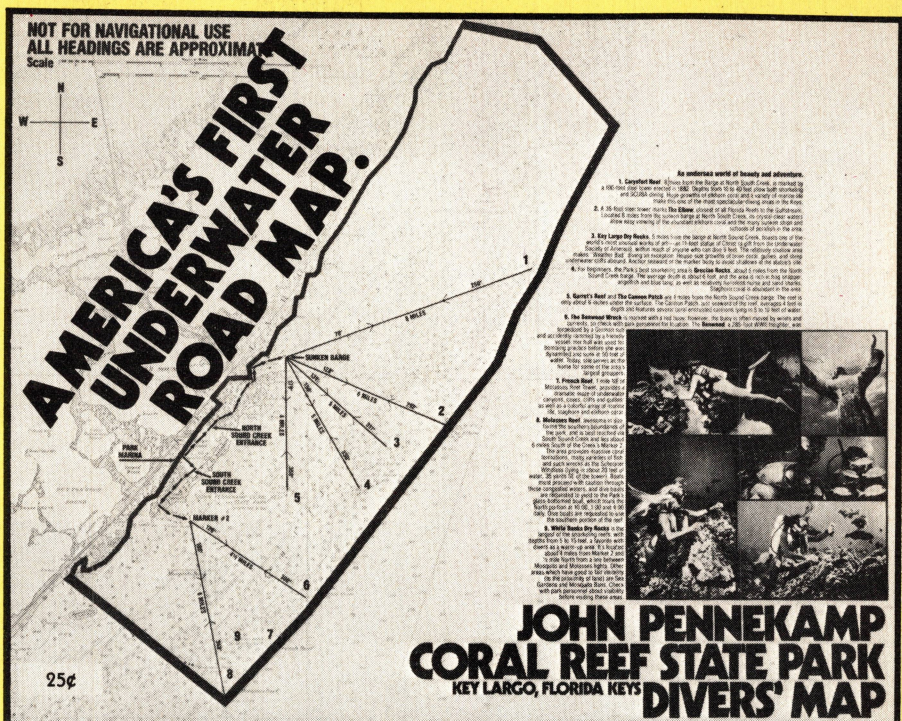


Porkfish at Looe Key, Key West.



Diver with lobster, Key West.

a 136 foot light tower is Alligator Reef. This area was named after a U.S. warship that sank in 1825. Alligator is a large area of diverse coral which was the scene of some of the first night dives in the Florida Keys. In the early 1960's, three marine biology graduate students from the University of Miami did research and photography at Alligator reef on hundreds of night dives. The results were published in National Geographic in 1964 and shortly thereafter, night diving began to be popular. Throughout the Upper Keys there are many good deep reefs and



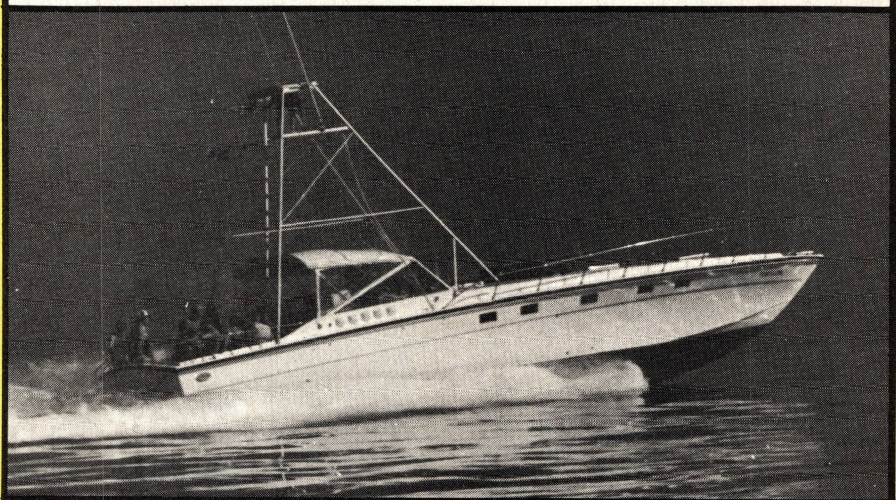
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ledges that are probably extensions of the same profile as deep Crocker Reef. Although difficult to find, almost every operator has favorite spots in the 45-80 foot range.

MIDDLE KEYS

The heart of the keys includes the city of Marathon, which is second only to Key West as a population center in the island chain. Here you can find numerous restaurants, shopping centers and a modern airport. Marathon has several well equipped dive shops, charter services and excellent motels. South of the city limits is the famed seven mile bridge and

still within the area, known as the middle keys is Big Pine Key with the spectacular Looe Key Reef offshore.

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Middle Keys diving is interesting and varied. Generally, the area is not as widely dived as Key Largo and Upper Keys, which allows for a little more flexibility in

Elkhorn coral and rock beauty, Marathon.



the charter schedules. A very interesting place to start sampling Middle Keys dive sites is a wide spread area known as the Coffin's Patch. This is a mile long stretch of scattered patch reefs located three and one-half miles southeast of Key Colony Beach. Some of the patches have pillar coral formations and the average depth is 35 feet. There are at least a dozen good dive spots in the area.

Delta Shoals is a shallow reef made up of scattered coral heads one and one-half miles east, northeast of Sombrero light. The remains of several wrecks can be found along the outside of the reef.

The most popular dive spot in the Marathon area is Sombrero Reef, seven and one-half miles southwest of Key Colony Beach. It is marked by a 142 foot light tower which makes it easy to find and accounts for part of the area's popularity. My most recent trip to Sombrero was aboard the *Lady Key Diver* from the Hall's Diving Center and Captain Chuck Saunders showed me a beautiful photogenic coral archway in shallow water just south of the light. Sombrero is characterized by extremely heavy fingers of coral and a well developed spur and groove system. There are magnificent ledges and ravines with colorful sponges and seafans over a wide area of bottom. This reef is worth several dives depending on the visibility.

There are extensive deep reefs throughout the Marathon area that have steep slopes of coral and huge sponge formations. The depths are generally 50-90 feet. Each operator has his favorite sleeper spots which he will be pleased to show you, along with some of the more standard dives.

Looe Key is one of the most beautiful reef dives in all the Florida Keys. This is actually a large reef area about six and one-half miles south, southeast of Big Pine Key and is awash at low tide. Several Marathon operators have boats and schedules that permit them to reach Looe Key on a semi-regular basis and it is definitely a dive to put on the top of your list. Depths range from 2-40 feet on the heaviest section of the reef which features lots of fish and a heavy system of coral fingers, ledges and overhangs. About one-quarter of a mile out from Looe Key, the bottom recorder will take a fast dip from 50-90 feet, signaling an excellent deep reef with an almost vertical drop-off.

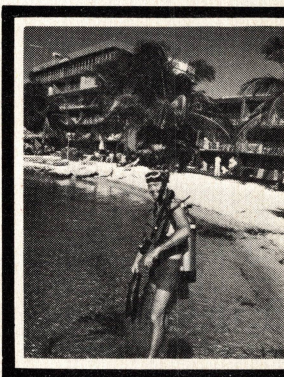
KEY WEST

Just when you think you have the keys figured out, you hit Key West, the last resort and the end of the road. In addition to some very interesting diving and excellent accommodations and support services, Key West is the Bohemia of the Florida Keys. It has a very special atmosphere and charm all its own. Partly historical, partly tourist oriented and partly an escape, Key West attracts a broad section of humanity and provides many

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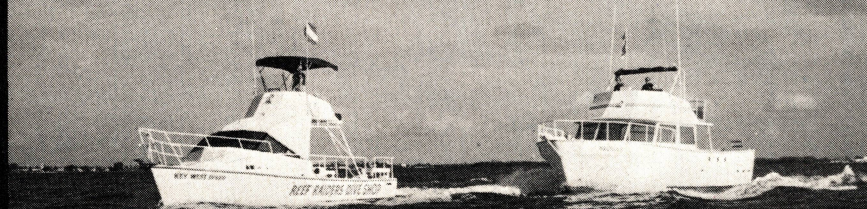
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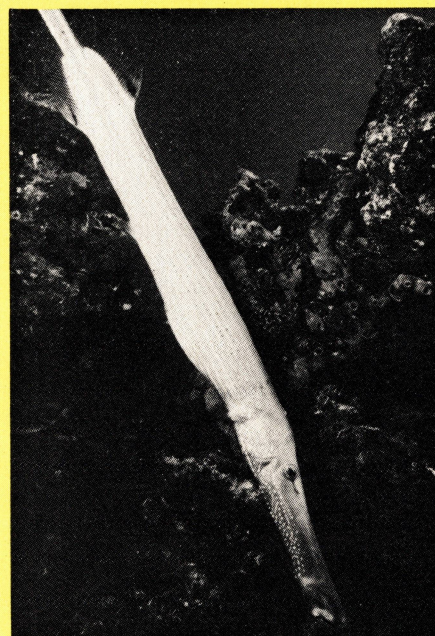
Photo by our staffmember
BARBARA GADDO



things to do during non-diving hours.

The waters off Key West and neighboring Boca Chica Key provide excellent coral reefs and some exciting shipwrecks. Perhaps because of the coming together of the waters of the Gulf of Mexico and the Atlantic, there is an abundance of fish life and a slightly better selection of species than other areas of the keys. Key West is also a popular point of departure for dive trips to Cay Sal Bank, the Tortugas and Marquesas Islands.

Located about four miles south of Boca Chica channel and only minutes apart are the popular reefs of the western, middle and eastern Sambos. These are heavy reef areas which feature some of the best examples of brain and pillar corals in all the keys. There are dozens of dive sites with lots of fish and good lob-



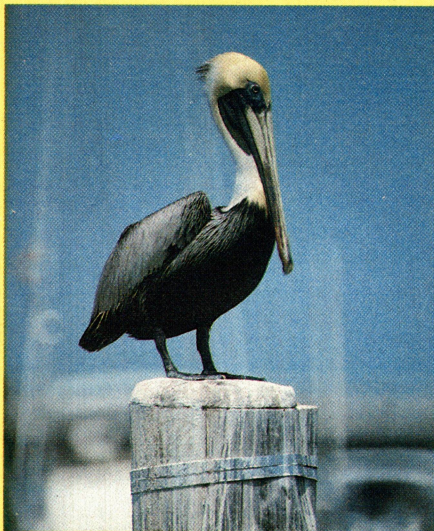
Trumpetfish at Davis Reef, Islamorada.



Western Sambo, Key West.

stering along the Sambos.

Five miles south of Key West are the reefs of Eastern Dry Rocks. This area features good general coral reef diving in shallow water best suited for snorkeling. Rock Key is about one mile west of the Eastern Dry Rocks and offers high relief reef formations with large vertical fissures through the reef to the sand bottom. The remains of several old ship-



Pelican surveys the docks, Marathon.

wrecks are close by.

Key, about one mile west of Rock Key, is well marked by a small island and 110 foot lighthouse and is probably Key West's most popular dive site. Part of its popularity is as a picnic spot and because the island provides a lee during bad weather. There are excellent deep ledges out from the island in 45-60 feet of water with numerous grouper and snapper.

There are many shipwrecks reported throughout the Key West area. Most are legitimate, a few are highly imaginative. Here, as in other areas of the keys are the remains of old Spanish wrecks from the treasure fleets, but they are only seen as scattered ballast stones. A few intact, modern wrecks are diveable and at least

Christ of the Abyss statue, Key Largo.



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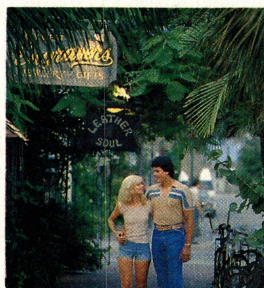
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Florida Keys Dive Operators

MILE MARKER	DIVE OPERATION	PHONE (305)	OWNER/ MANAGER	BOAT CAPTAIN	COMPRESSOR	TANKS	AIR FILLS	BOAT/ CAPACITY	DEPARTURE TIMES	TYPE OF TRIP	MAILING ADDRESS
106.5	Capt. Slate's Atlantis Dive Center	451-3020	Spencer and Amy Slate	Capt. Spencer Slate Capt. Jim Fulcher	Worthington 12 cfm/5000 psi Worthington 12 cfm/5000 psi	80 steel	\$2.00 (72's) 2.50 (80's)	40' Lindsay/40 divers 45' Custom/28 divers 42' Bruno/6 divers	8:30 a.m. 1:00 p.m. 7:00 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	51 Garden Cove Dr. Key Largo, FL 33037
105.5	Harry Keitz's American Diving Headquarters	451-0037 451-0039	Harry Keitz	Capt. Bill Koebel Capt. Jeff Wirs Capt. Ken McVitie Capt. Lisa Colvin Capt. Jim Longendyke	Worthington 15 cfm/3500 psi Worthington 15 cfm/3500 psi	300 steel	\$1.75 (72's) 2.00 (80's)	36' Custom/20 divers 36' Custom/22 divers 46' Harkers Island/20 divers 28' Cary/6 divers 24' Proline/6 divers	8:30 a.m. 9:30 a.m. 12:30 p.m. 1:00 p.m. 3:30 p.m. 6:15 p.m.	2 tank boat dive 1 tank boat dive 1 tank boat dive 2 tank boat dive 1 tank boat dive 1 tank night dive	Rt. 1, Box 274-B Key Largo, FL 33037
104	Steve Klem UW Guide Service	451-1831 451-1198	Douglas Cook	Capt. Douglas Cook	None	12 steel	\$2.00 all sizes	25' Pacemaker/6 divers	8:30 a.m. 1:30 p.m. 7:30 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	P.O. Box 1122 Key Largo, FL 33037
104	Sundivers Station, Inc.	451-0676	Gary Rinn Christy Edmons, Mgr.	Capt. Gary Rinn	Worthington 15 cfm/3800 psi	60 steel	\$2.00 (72's) 2.50 (80's)	34' Custom/20 divers	8:30 a.m. 1:00 p.m. 6:30 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	Rt. 3, Box 289-A Key Largo, FL 33037
103.5	Bill Crawford's Tropic Isle Dive Shop	451-1063	Charlotte ("Charlie") Crawford	Capt. Don Myers Capt. David Ireland Capt. Jim Doyle	Worthington 20 cfm/5000 psi Ingersoll 15 cfm/5000 psi	100 aluminum	\$2.00 (72's) 2.50 (80's)	50' Marine Mgmt./38 divers 38' Sea Lark/6 divers 26' Trojan/6 divers	8:30 a.m. 1:00 p.m. 8:30 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	P.O. Box 755 Key Largo, FL 33037
103.5	Key Largo Diving Headquarters	451-1151	Terry Holderfield	Capt. E. J. ("Tiny") Wirs Capt. Tom Eckhardt Capt. Rex Rothling Capt. Terry Holderfield	Worthington 15 cfm/3500 psi Worthington 15 cfm/3500 psi	100 steel	\$2.00 (72's) 2.50 (80's)	48' Marine Mgmt./48 divers 25' Delta/14 divers 26' Stapleton/6 divers	8:00 a.m. 1:00 p.m. 7:00 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	Rt. 1, Box 293 Key Largo, FL 33037
102.5	Ocean Divers	451-1113	Joe Clark Doc Schweinler	Capt. Doc Schweinler Capt. Danny Vinco Capt. David Rouse	At Ocean Divers Marina	At Ocean Divers Marina	At Ocean Divers Marina	At Ocean Divers Marina	12:30 p.m. 6:30 p.m.	2 tank boat dive 1 tank night dive	P.O. Box 1113 Key Largo, FL 33037
102.5	Pennkamp Park Concession	451-1621 1-800-432-2871 (Fla. toll free)	Randy Pegram	Capt. Frank O'Connor Capt. Dennis Baut Capt. Fred Wheeler Capt. Bob Gross Capt. Chuck Girard	Worthington 20 cfm/5000 psi Worthington 20 cfm/5000 psi	90 aluminum	\$2.25 all sizes	61' Harkers Island/61 divers 48' Marine Mgmt./49 divers 32' Prowler/16 divers 34' Sailing Trimaran/6 divers	9:30 a.m. 1:00 p.m. 6:00 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	P.O. Box 13-M Key Largo, FL 33037
101.5	Quiescence Diving Services, Inc.	451-2440	Rob Bleser Paul Caputo Chuck Priest, Mgr.	Capt. Bob Bleser Capt. John Mumford Capt. Jack Doughty	Mako 9 cfm/5000 psi	40 steel	\$2.00 (72's) 2.50 (80's)	25' Delta/6 divers 42' Motorsailer/6 passengers	9:00 a.m. 1:00 p.m. 6:30 p.m.	1 or 2 tank boat dive 1 or 2 tank boat dive 1 tank night dive full day charters	P.O. Box N-13 Key Largo, FL 33037
100	Capt. Bob Klein's Scuba Shop	451-DIVE	Capt. Bob Klein	Capt. Bob Klein Capt. Alex Kitchens Capt. Jenny Bond	Mako 15 cfm/5000 psi Mako 4.8 cfm/3200 psi	40 aluminum	\$2.00 (72's) 2.50 (80's)	50' Cigarette/22 divers 31' Diesel/6 divers 25' Bayliner/6 divers	10:00 a.m. 2:00 p.m. 7:00 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	P.O. Box 1849 Key Largo, FL 33037
100	Ocean Divers Marina	451-0286	Joe Clark Doc Schweinler	Capt. Doc Schweinler Capt. Danny Vinco Capt. Dave Rouse	Ingersoll 100 cfm/3500 psi Poseidon 7 cfm/3500 psi	200 steel	\$2.50 (72's) 3.00 (80's)	65' Custom/45 divers 50' Custom/35 divers	12:30 p.m. 6:30 p.m.	2 tank boat dive 1 tank night dive	P.O. Box 1113 Key Largo, FL 33037
100	Sea Dwellers	451-3640 245-0333 (Miami)	Larry Bateman T. J. Holub	Capt. Larry Bateman Capt. T. J. Holub Capt. Jam Holub	Worthington 18 cfm/3500 psi Worthington 15 cfm/3500 psi	150 mixed	\$2.00 (72's) 2.50 (80's)	45' Custom/20 divers 65' Custom/48 divers	9:00 a.m. 1:00 p.m. 7:00 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	P.O. Box 1796 Key Largo, FL 33037
100	Sea Fever Diving Cruises	451-0005	Capt. Tom Guarino	Capt. Tom Guarino	Mako 5 cfm/2600 psi on board boat	20 steel	On boat only	40' Lindsay/17 divers	8:30 a.m. 12:30 p.m. 8:30 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	P.O. Box 1335 Key Largo, FL 33037
97.5	Diver's World	852-5498	Ernie Krumbien	Capt. Corky Toth Capt. Roger Blevins	Joy 13 cfm/3500 psi	45 steel	\$1.75 all sizes	33' Stuart-Angler/18 divers 25' Delta/14 divers	9:00 a.m. 1:00 p.m. 6:30 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	P.O. Box 1663 Key Largo, FL 33037
95	Aquanaut Charter at Bryn Mawr	852-9111	Glenn Ward	Capt. Marina Ward Capt. Glenn Ward	Ingersoll 15 cfm/3000 psi	40 steel	\$2.00 (72's) 2.50 (Non-charter divers)	28' Formula/6 divers 31' Cary/6 divers 21' Seacraft/6 divers	9:00 a.m. 1:00 p.m.	2 tank boat dive 2 tank night dive	P.O. Box 459 Tavernier, FL 33070

84.5	Holiday Isle Dive and Swim Center	664-4145 248-4879 (Miami)	Ed Armstrong	Capt. Mary Emmett Capt. Mike Fitz	Mako 20 cfm/3500 psi	40 steel	\$2.50 all sizes	36' Ensign/6 divers 30' Cigarette/6 divers	9:00 a.m. 1:00 p.m. 7:00 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	P.O. Box 482 Islamorada, FL 33036
84.5	Reef Shop Pro Dive Center	664-4385	Jim Williams Patti Williams	Capt. Jim Williams Capt. John Hopkins	Joy 12.5 cfm/3500 psi	16 aluminum	\$2.50 (72 s) 3.00 (80 s)	31' Sea Ray/6 divers 30' Enterprise/6 divers 20' Sea Lark/4 divers 20' Sea Lark/4 divers	9:00 a.m. 1:30 p.m. 7:00 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	Rt. 2, Box 7 Islamorada, FL 33036
79.5	Buddy's Dive Shop	664-4707	Buddy Brown	Capt. Buddy Brown	Joy 15 cfm/5000 psi	38 mixed	\$2.50 all sizes	24' Open Boat/6 divers 26' Diesel/6 divers	9:00 a.m. 1:30 p.m. 7:00 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	P.O. Box 409 Islamorada, FL 33036
68.5	Atlanta Marina and Dive Shop	664-4318	Fred Dawson	Capt. Roy Smith	Worthington 12.5 cfm/3500 psi	14 steel	\$2.00 (72 s) 2.50 (80 s)	32' Owens/6 divers 16' Clipper/3 divers 16' Clipper/3 divers 16' Clipper/3 divers 17' Open Fisherman/4 divers	9:00 a.m. 1:00 p.m. 8:30 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	P.O. Box 966 Long Key, FL 33001
53.5	Key Colony Divers	289-1141	John La Mantia	Capt. John La Mantia	Worthington 15 cfm/5000 psi	24 steel	\$1.25 (72 s) 1.50 (80 s)	30' Custom/6 divers	8:30 a.m. 1:00 p.m. 7:30 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	Key Colony Beach Key Colony, FL 33051
53	Divers Headquarters	743-4501	Art McDermott	Capt. Art McDermott Capt. Paul DeMoranville	Ingersoll 15 cfm/3500 psi	16 aluminum	\$1.50 (72 s) 1.75 (80 s)	26' Algas/6 divers	8:00 a.m. 1:00 p.m. 7:00 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	11511 Overseas Hwy. Marathon, FL 33050
53	The Diving Site & Coral Lagoon Resort	289-1021	Dimar Biller	Capt. Robert Tilman Capt. Charles Pinizy Capt. Bill Symson Capt. Dimar Biller	Worthington 16 cfm/5000 psi Worthington 16 cfm/5000 psi Worthington 14 cfm/5000 psi	90 mixed	\$1.00 (72 s) 1.50 (80 s)	40' Custom/20 divers 34' Crusader/18 divers 25' T-Craft/6 divers	8:00 a.m. 1:00 p.m. 6:30 p.m.	2 tank boat dive 2 tank boat dive 2 tank night dive	12399 Overseas Hwy. Marathon, FL 33050
50	Hurricane Aqua Center	743-2400	Capt. Ed Davidson	Capt. Ed Davidson Capt. Eric Keitel	Mako 19 cfm/5000 psi	40 aluminum	\$2.50 all sizes	64' Aluminum Custom/ 49 divers	9:30 a.m. 8:00 a.m.	2 tank full day dive Overnight charters	4650 Overseas Hwy. Marathon, FL 33050
48	Hall's Diving Center & College	743-5929	Bob & Linda Brayman	Capt. Chuck Saunders Capt. Jack Laursen Capt. Bob Brayman	Worthington 15 cfm/5000 psi Worthington 15 cfm/5000 psi	54 steel	\$2.00 (72 s) 2.50 (80 s)	40' Custom/30 divers	7:00 a.m. 9:00 a.m. 12:00 p.m. 1:30 p.m. 6:00 p.m.	2 tank full day dive 2 tank boat dive 2 tank full day dive 2 tank boat dive 2 tank night dive	1688 Overseas Hwy. Marathon, FL 33050
39	Kerentia Diving Club	872-2217	Leith Thijs	Capt. Al Price	Worthington 15 cfm/4200 psi	26 mixed	\$1.75 (72 s) 2.00 (80 s)	44' Open Boat/26 divers	10:00 a.m.	3 tank full day dive	Rt. 1, Box 790 Big Pine Key, FL 33043
30.5	Underseas, Inc.	872-2700 872-9555	George & Maryanne Rockett	Capt. George Rockett Capt. Paul Moore Capt. Bob Perez Capt. Joe Glenn Capt. Bob Farrell	Worthington 20 cfm/5000 psi Worthington 20 cfm/5000 psi	100 mixed	\$1.50 (72 s) 1.75 (80 s)	40' Monroe/6 divers 36' Ensign/6 divers 36' Ensign/6 divers 25' Mako/6 divers	8:30 a.m. 10:00 a.m. 1:00 p.m. 7:00 p.m.	2 tank boat dive 3 tank or snorkel 2 tank boat dive 2 tank night dive	P.O. Box 319 Big Pine Key, FL 33043
29.5	Keys Sea Center Inc.	872-2243 872-2244	Carl Aufrecht	Capt. Bill Lemon Capt. Bart Masker Capt. Art Wright	Worthington 20 cfm/5000 psi Worthington 12 cfm/5000 psi	40 mixed	\$1.25 (72 s) 1.50 (80 s)	30' Custom/15 divers 30' Custom/6 divers	8:00 a.m. 10:00 a.m. 1:00 p.m. 7:00 p.m.	2 tank boat dive 2 tank boat dive 2 tank boat dive 2 tank night dive	P.O. Box 515 Big Pine Key, FL 33043
24.5	Triangle Water-Sports, Inc.	745-3880	Shel Perloff	Capt. Phil De Cuele Capt. Don Lozak	Joy 15 cfm/1500 psi	24 aluminum	\$1.25 (72 s) 1.50 (80 s)	23' T-Craft/6 divers 24' Pontoon Boat/6 divers 15' Mailbu/4 divers	8:30 a.m. 1:00 p.m.	2 tank boat dive 2 tank boat dive	P.O. Box 321 Summerland Key, FL 33042
5	Angler's Dive Shop	294-4248	Bob Harland	Capt. Tom Halford Capt. Ed Osborne	Joy 15 cfm/3000 psi Joy 15 cfm/3000 psi	20 aluminum	\$2.50 (72 s) 3.00 (80 s)	26' Flatpot/6 divers 25' Open Boat/6 divers	9:00 a.m. 9:00 a.m. 1:30 p.m. 6:00 p.m.	2 tank full day dive 2 tank boat dive 2 tank boat dive 2 tank night dive	U.S. 1 Stock Island Key West, FL 33040
4.5	Reef Raiders Dive Shop	294-0660	Franco & Georgeann Piacibello	Capt. Franco Piacibello Capt. Billy Deans	Ingersoll 21 cfm/5000 psi Ingersoll 20 cfm/5000 psi Ingersoll 18 cfm/3000 psi	55 steel	\$2.50 (72 s) 3.00 (80 s)	50' Marine Mgmt./48 divers 34' Crusader/18 divers	9:00 a.m. 1:30 p.m. 7:00 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	U.S. 1 Stock Island Key West, FL 33040
2	Key West Pro Dive Shop	296-3823	Bob Holston	Capt. George Reed Capt. Stefan Brozynski	Worthington 15 cfm/3000 psi	60 steel	\$2.50 (72 s) 3.00 (80 s)	60' Custom/49 divers	1:00 p.m. 7:00 p.m.	2 tank boat dive 1 tank night dive	1605 N. Roosevelt Blvd. Key West, FL 33040
0	Reef Raiders Dive Shop	294-3635	Franco & Georgeann Piacibello	Capt. Franco Piacibello Capt. Billy Deans	At Stock Island Store	At Stock Island	\$2.50 (72 s) 3.00 (80 s)	50' Marine Mgmt./48 divers 34' Crusader/18 divers	9:00 p.m. 1:30 p.m. 7:00 p.m.	2 tank boat dive 2 tank boat dive 1 tank night dive	109 Duval St. Key West, FL 33040

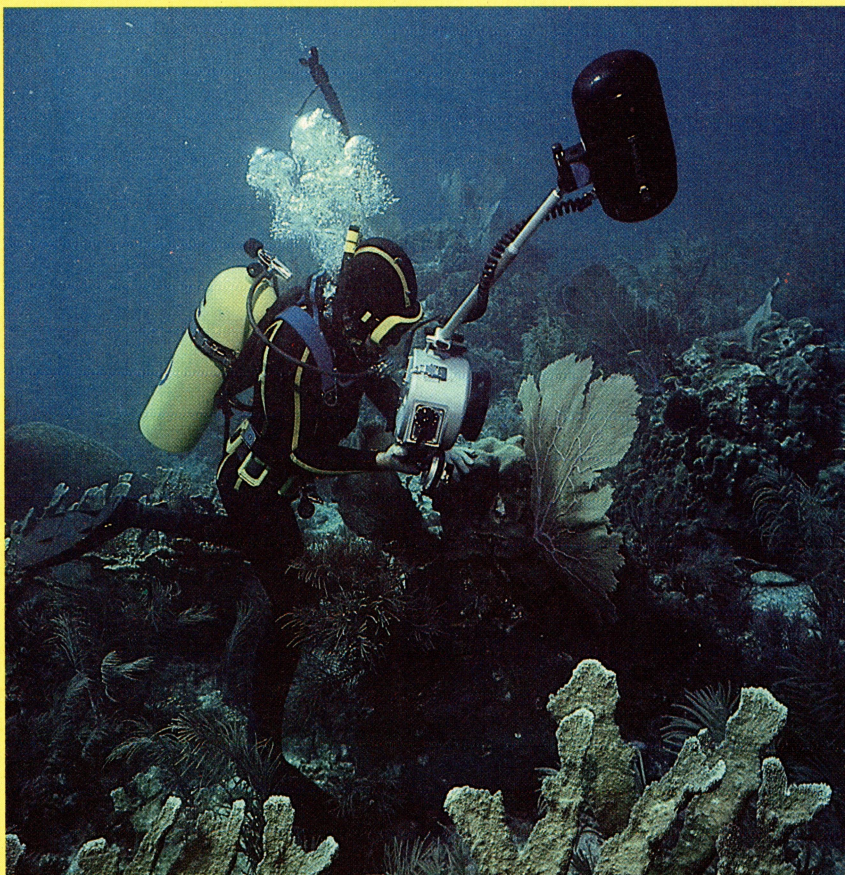


Large schools of colorful fish are common at Sombrero Reef, Marathon. This school is mostly cottonwicks, but also includes other species.

one is very photogenic. The *Aquanaut* is an 82 foot steel tugboat with its hull and superstructure intact. The wreck was shown to me by Capt. Franco Piacibello of the Reef Raiders Dive Shop and lies in 80 feet of water not far from the Sambos. When current and visibility allow, it is possible to anchor on the wreck for a safe, 30 minute no decompression dive. There are normally a lot of fish on the wreck and it's not unusual to see several large groupers. The wheelhouse is in pretty good condition and covered with marine growth. With care, you can swim into the pilothouse and photograph a diver on the outside framed through a window. As with most shipwrecks, it is necessary to watch out for fishing lines.

A two week vacation in the keys will allow for a good cross section of dive sites and enough time to discover what each area has to offer. Three days in each of the seven areas we have identified will produce dozens of dives and enough bottom time to satisfy almost every fish watcher or photographer. Florida's sunny islands and the Great American Reef offer the pleasures of tropical diving within everyone's reach.

When you drive to the keys, remember that some of the best dive shops, with an excellent selection of equipment, are to be found in Florida close to the highway. >



Photographer at Molasses Reef, Key Largo.

SDM travel

SECTION

Directly on the Equator and some 600 miles due west of Ecuador lie the pristine volcanic islands known as the Galapagos.

Five million years ago (more or less), these rocky outposts burst from the sea in the frenzy of tectonic fire-works. There had been no land at this location and there was no animal life present. Over the centuries the ocean currents brought wandering species to these untouched shores, some on pieces of wreckage, others as floating eggs that would otherwise have perished in the ocean void.

During the millenia that followed, a natural process (evolution) combined with a special circumstance (these arriving species found no competitors or predators here), produced an incredible result. In these remote islands, fully one-quarter of all the terrestrial species are endemic; that is, they are found nowhere in the world but here.

Most divers are unaware that the same uniqueness applies to the in-shore marine species as well. See & Sea Travel has pioneered diving the Galapagos since 1972; during that time our divers have thrilled to a host of special encounters. For example, when one of my photographs of a tartan hawkfish appeared in *SKIN DIVER*, scientists informed me I had extended the known range of that animal. On another occasion I had the good fortune to photograph the strange fish scientists call the wrasse-assed bass.

There are great schools of sea lions and flightless cormorants or penguins may swim past, searching for food. Giant starfish, enormous scorpionfish and oversized porcupinefish are occasionally seen.

Every dive in the Galapagos is a



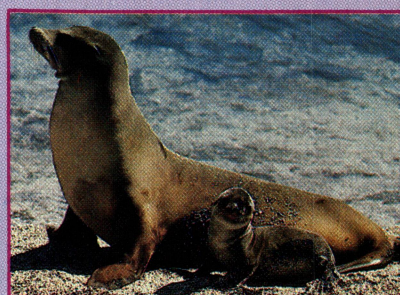
THE PRISTINE VOLCANIC GALAPAGOS

**Text and Photography
by Carl Roessler**

parade of wonders, and between dives our groups manage to fit in all the shore photography that regular visitors come to see. On each of my trips to these enchanted islands I have shot over 100 rolls of film.

The See & Sea program consists of a full two-week cruise among the islands, departing in spring and summer. There are two nights in Quito before and two nights after the cruise owing to airline connections. Many clients take the opportunity to add a few days to see Cuzco and the ancient city of Macchu Picchu in the high Andes as well.

During our two-week cruise, we



cross the Equator at least six times, visiting a dozen major and many smaller islands. We photograph marine iguanas at Punta Espinosa in Fernandina Island, fur sea lions on James Island, huge nesting albatross on Hood Island, great schools of huge amberjack at Gordon Rocks or Kicker Rock. Every day and every dive provides a memory for a lifetime. We cruise aboard a 70 foot motor-sailer with private double accommodations for ten divers.

It was in the Galapagos that Charles Darwin had one of the flashes of insight that culminated in *Origin of Species*. They are certainly some of the earth's special places. All See & Sea trips are accompanied by an escort and have the services of an on-board naturalist licensed by the government of Ecuador. For more information, contact See & Sea. 🐬

The Buccaneer

...St. Croix's most elegant dive resort

Text and Photography by Geri Murphy

The Buccaneer Hotel is the kind of resort of which vacation dreams are made. Located on the picturesque Caribbean island of St. Croix, it is a totally self-contained playground for the outdoor enthusiast who is serious about golf, tennis, watersports or scuba. Few hotels can boast of such lavish surroundings or such good service. While this elite resort may not be for everyone, it is indeed a perfect choice for the discerning diver desiring a touch of class and willing to pay a little more to obtain it.

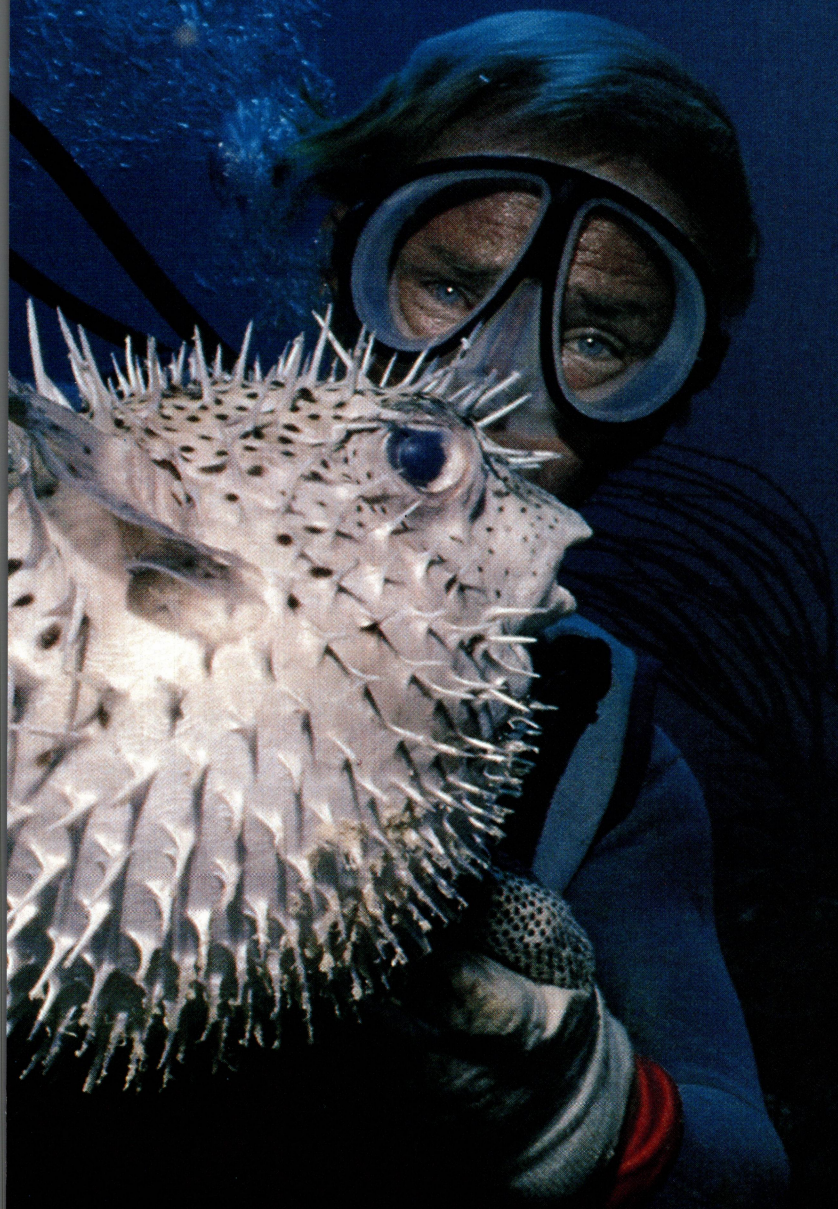
The Buccaneer is on the scenic north coast of St. Croix, just two miles east of Christiansted, the island's largest settlement and most fascinating free port shopping center. It is far enough from town to eliminate congested traffic and ensure privacy, yet close enough for frequent and convenient visits for the purpose of shopping, sight-seeing or evening dining. Best of all, the Buccaneer is ideally situated in the heart of some of St. Croix's best reefs. Green Cay Slope, one of the best medium depth coral reefs in the Virgins, lies just one mile out from the hotel pier. Buck Island National Monument and its world famous underwater trail is four miles east of the hotel and the ever popular Long Reef lies two miles in the opposite direction. Leaving from the Buccaneer pier, a hotel guest can be on one of two dozen different coral reefs within 15 to 20 minutes.

Perhaps the most impressive aspect of the Buccaneer is this unique resort's luxurious landscape. The hotel sits on 240 acres of rolling hills, carpeted with lush green lawns, well-manicured shrubbery and bordered by powder white sand beaches. The hotel actually sits in the center of an 18 hole championship golf course, surrounded on three sides by magnificent fairways and rich putting greens. The fourth side is open to the Caribbean Sea and three separate beaches. The main hotel building is perched high on a hill, overlooking much of St. Croix. It offers a spectacular panoramic view of the many passing sailboats during the day and the twinkling lights of Christiansted Harbor by night. Many people stay at the Buccaneer just for its impressive view and elegant surroundings.

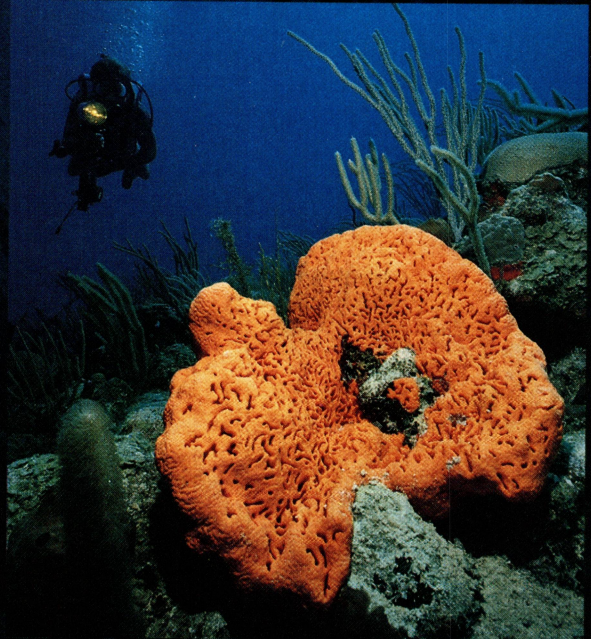
The Buccaneer has a total of 159 rooms that are spread out on its immense acreage. There is no crowding; privacy is one of this hotel's main attractions. All the rooms have a private balcony or terrace, telephone and air-conditioning. The guest accommodations are arranged in a triple-tier design against the gently sloping hills, facing the sea. The main building and ridge rooms are perched on top of the hill, offering the most spectacular view. Halfway down the hillside are the newly built tennis villas, within close proximity of the eight championship tennis courts, just a few steps away. Beachside cottages and family suites fringe the hotel shoreline and provide easy access to the hotel's long list of watersports. Guests usually select rooms which are closest to the sport they love best.

In addition to the Buccaneer's heavy emphasis on golf and tennis, this resort excels in watersports. It has by far the finest beach on all of St. Croix. A long crescent of pure white sand beach is skirted by a grove of coconut palms on one side and turquoise blue tropical sea on the other. Nestled under the palms is a complete watersports concession with sailboats, snorkeling gear and suntan lotions. Set back from

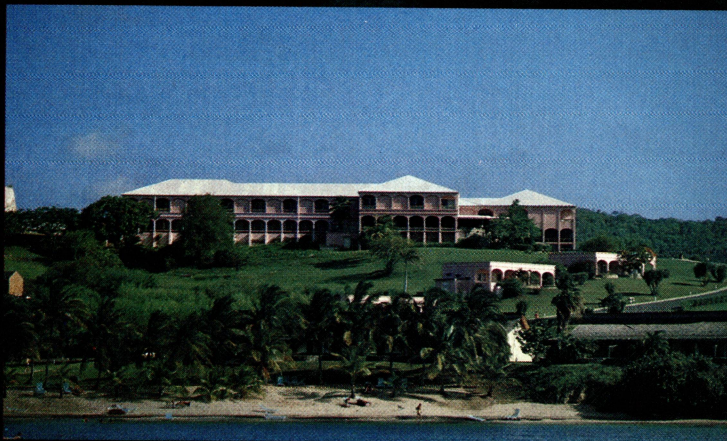




Left, divemaster Larry Angus (of Caribbean Sea Adventures) poses with his pet puffer at Green Cay Slope, St. Croix.



Green Cay Slope



The Buccaneer Hotel

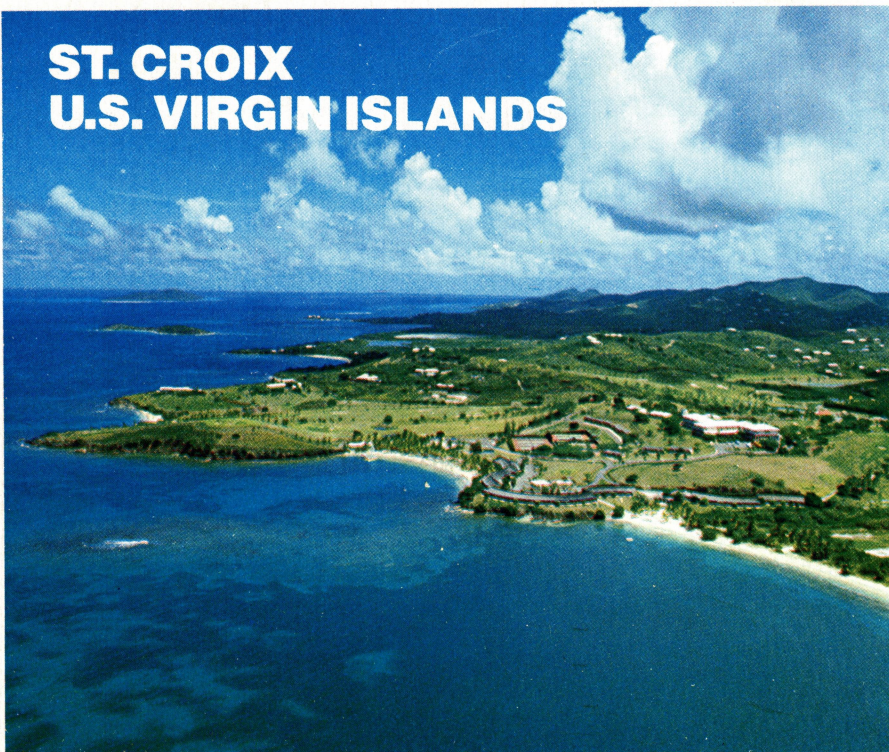


Dive boat Deliverance



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THE BUCCANEER

the beach is the Little Mermaid Restaurant — a perfect place to enjoy a lunchtime snack or a cool drink. The privacy of this beach ensures an uncrowded and tranquil environment.

But, the finest aspect of the Buccaneer watersports program is its scuba diving, supervised by Larry Angus, owner and manager of Caribbean Sea Adventures, St. Croix's oldest and most successful dive operation. Originally from Canada, Larry is a physical education graduate of the University of Toronto. He started his dive career in 1963, making his first dive in the chilly 50° waters of Lake Ontario. Larry arrived in St. Croix 11 years ago and started his watersports business with a single 25 foot charter boat for diving and fishing trips. From this modest beginning Larry has shrewdly parlayed his business into the largest watersports conglomerate in the Virgin Islands. With a staff of 25 employees, Larry operates two dive shops in downtown Christiansted, three satellite beach operations at different hotels and a large fleet of watersports craft including five custom dive boats and assorted fishing boats and sailboats.

Despite his success and big business responsibilities, Larry still devotes a good deal of his time to his first love — scuba diving. He is a certified PADI and SSI dive instructor who frequently skips one of his many dive boats and personally leads Buccaneer guests on exhilarating trips to St. Croix's finest dive locations. Larry maintains a snorkel and watersports concession right on the beach at the Buccaneer Hotel, where guests can rent snorkel gear, sign up for dive lessons or make reservations for one of the many daily scuba trips. Most of these are conducted aboard the M/V *Deliverance*, a 40 foot custom-built boat which can comfortably accommodate up to 23 divers. Designed especially for scuba diving, this craft features built-in tank racks, a freshwater shower, and a full width platform on the stern.

Larry generally operates two trips daily. The morning one departs at 9:00 am right from the Buccaneer dock and consists of two tank dives at two different locations. The afternoon trip departs at 2:00 pm and is a single tank dive at still another location. During the busy season there may be several dive boats departing simultaneously, headed for different dive sites. Larry also conducts night dives by boat with departures ranging from 6:30 to 7:30 pm depending on the time of the year. Night dives are usually made on Long Reef, but on special occasions Larry will run an excursion to the Frederiksted Pier. Once a week, Larry schedules an all day, long distance

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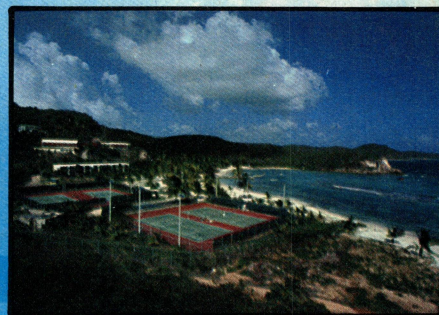


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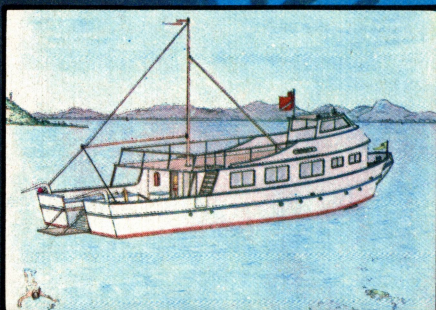
If you reserve your stay at Villa Olga you'll be at headquarters. The total atmosphere here is diving. You'll find everything that you would expect of a P.A.D.I. training center. All of our rooms are new, air-conditioned and have a great view of charming Charlotte Amalie, world famous for its freeport shopping. There are limitless eating and drinking experiences just a 10 minute walk away.



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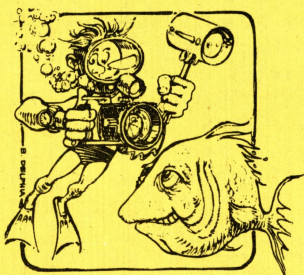
The good word here at the St. Thomas Diving Club is professional. We look, act and are professionals. Our head instructor is the world renowned photo journalist, adventurer and T.V. personality, Armando Jenik. He is surrounded by the Caribbean's largest team of professional instructors. Our diving equipment is the best & safest money can buy.



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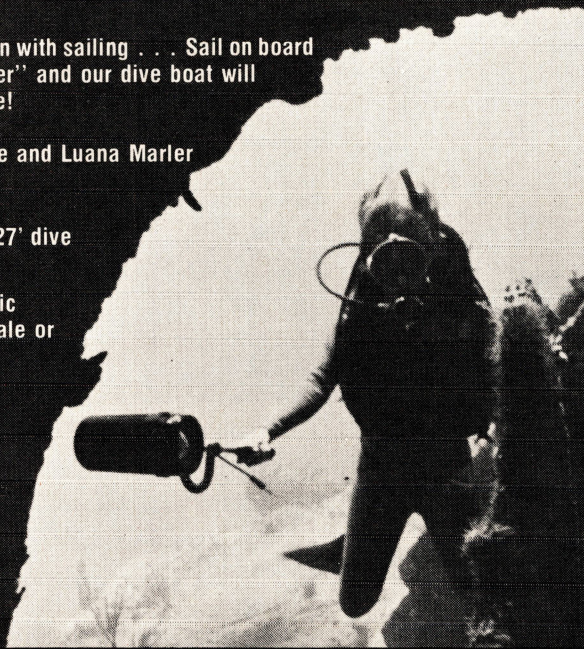
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THE BUCCANEER

cruise to the wreck of the *Rhone*, in the British Virgin Islands. This trip usually departs at 7:00 am and returns to St. Croix in time for dinner. The *Rhone* trip is a two-tank dive and a box lunch from the hotel is recommended.

Over the last decade, Larry Angus and his staff of experienced dive guides have discovered and catalogued more than 50 excellent dive sites among the reefs and drop-offs that surround St. Croix. Today, Larry has one of the largest repertoires of dive sites on the island. Customers return year after year and Larry continues to surprise them with new, exciting locations on every visit.

One of his favorite dive sites is a reef that lies quite close to the Buccaneer pier. Less than one mile from the dock, Green Cay Slope can be reached in a matter of minutes and provides endless hours of diving delight. The reef has a 45 degree coral slope ranging in depth from 35 to 100 feet. Visibility in this location often exceeds 100 feet and the slope is loaded with fish. It is particularly famous for its pufferfish and Larry has an uncanny ability for catching one of these creatures by hand on almost every dive trip. When this strange fish is scratched on its stomach, it immediately begins gulping seawater, swelling its body into a big balloon. Other residents of this reef include barracuda, schooling jacks, spadefish and eagle rays.

Less than 10 minutes by boat ride to the west is Long Reef, a medium depth coral reef which stretches for several miles. Dive depths along this reef range from 30 to 80 feet and the coral formations change profile depending on where the boat is anchored. Midway along this reef is a large ravine, 30 feet wide, that cuts straight through the massive coral reef. There is a low cave on the west side of the ravine barely three feet high and approximately 20 feet long. Two large nurse sharks are frequently seen here and the spot has been named Sleeping Shark Hole. Other spots along Long Reef offer excellent opportunities for viewing huge elkhorn coral formations, big brain corals and staghorn patches.

While Buck Island has developed a worldwide reputation for snorkeling along the shallow underwater trail, there is still another side to this remarkably beautiful reef. Larry conducts scuba diving trips to the deeper coral reefs outside the underwater trail boundaries where scuba is allowed. Here the depths range from 35 to 60 feet and divers can view impressive coral formations and shoot underwater pictures to their hearts' content. North Cut offers a variety of large coral pinnacles and frequently great schools

(Continued on Page 75)

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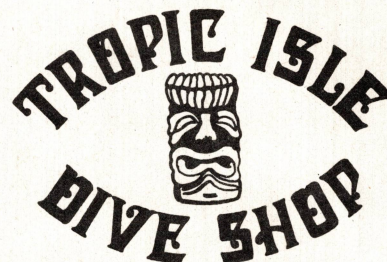
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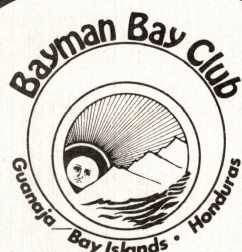
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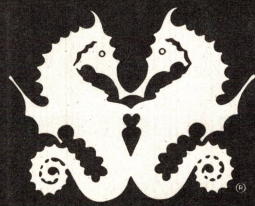
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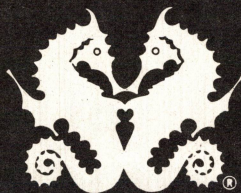
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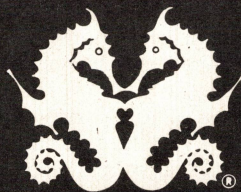
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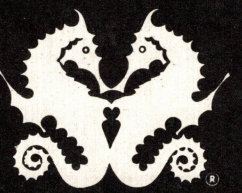
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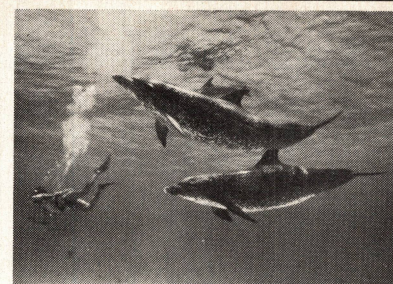


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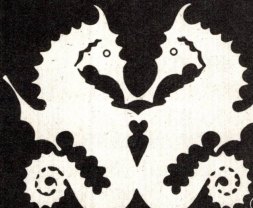
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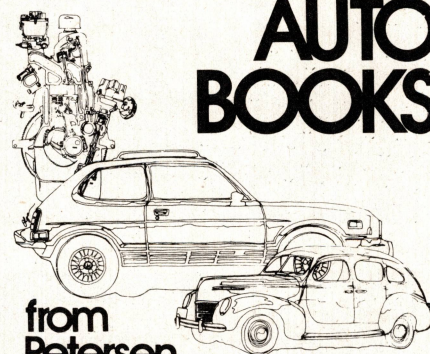
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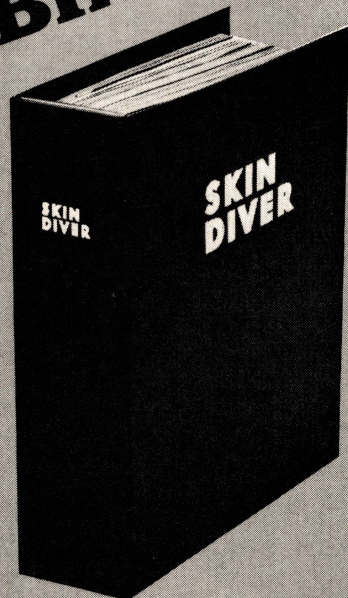
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THE BUCCANEER

(Continued from Page 70)

of fish. The Pillars provide a breathtaking view of towering mounds of coral rising up from 50 feet of water. Visibility in the Buck Island area can range from 70 to 150 feet.

Another of Larry's favorites, that he discovered, is the Stacks. This secret dive spot consists of an undulating coral reef with coral ridges, valleys and a series of mini-walls. Dive depths range from 40 to 65 feet and visibility frequently exceeds 100 feet. The mini-walls are covered with a colorful array of encrusting sponges, tunicates and other macro marine life. These walls are gilded in a brilliant patchwork of colors ranging from bright orange to electric blue. Other popular dive sites include; Salt River Drop-Off, Neptune's Throne, Scotch Bank, Shark Alley, Porpoise Rocks and Grapetree Caves.

The Buccaneer Hotel offers four different types of accommodations and the rates are based upon size, view, location and time of year. For example, the most expensive deluxe room on the beach or in the villas can be as high as \$165 (two persons, EP) during Christmas week; a standard room can be as low as \$55 (two persons, EP) during the summer. The rates change eight times a year, so it is best to call or write to the Buccaneer's U.S. booking agent for up-to-date information and reservations. Contact: Ralph Locke, 315 East 72nd St., N.Y., N.Y. 10021 or call (212) 586-3070.

Caribbean Sea Adventures offers Buccaneer guests a choice of two dive packages; a six dive package for \$125 or a ten dive package for \$200. These include boat, certified divemaster and all scuba gear. For more information about rates and schedules you can contact: Larry Angus, Caribbean Sea Adventures, P.O. Box 3015, Christiansted, St. Croix, U.S.V.I. 00821. You can reach Larry by telephone by dialing (809) 773-5922 during the day or (809) 773-2100 in the evening. 🐠

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The Reef House Resort, located on the Isle of Roatan, Bay Islands, Honduras, has two managers for 1981-1982.

Mandy Wagner, general manager, is 28, holds a Masters Degree in Leisure Service from the University of Florida. A certified diver, she resided in Europe for two years and received her schooling in Mobile, Alabama and New Orleans, Louisiana.

Tino Monteroso, the divemaster and assistant manager, is 26. A native of Guatemala, he has lived and worked on Roatan for five years. 🐠

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SAN SALVADOR MIXUP

"Please don't confuse the Bahamian vacation island of San Salvador with the stormy capital city of the Central American Republic of El Salvador," says Dick Batchelder, president of Columbus Landings Service Company. "It's a case of mistaken identity."

Recent terrorist activities and fighting in the Central American City of San Salvador has made life far from easy for the travel desk staff that books reservations for one of the most popular dive resorts in the Bahama Islands. Confused and uninformed vacationers seem unaware that there are two San Salvadors with the identical spelling. According to travel desk manager, Jan Milbyer, "Things get so bad sometimes that even our mail is mistakenly delivered to the other San Salvador."

The San Salvador that hosts more than 2000 divers annually is a small tropical resort in the southeastern Bahamas. It is a quiet, peace loving island with a population of only 821. It has one resort hotel that caters primarily to scuba divers. Crime is so rare on this island that the town jail has not been used for years. San Salvador Islanders are a group of extremely friendly and well mannered people who welcome visiting American tourists.

The other San Salvador, which is mentioned almost daily in the newspapers and on news broadcasts, is the capital city of a small Central American Republic located between Guatemala and Honduras. It is 1700 miles southwest of the Bahamas and borders the Pacific Ocean.

Should you want to learn more about the differences between the two San Salvadors, and where to go for a really enjoyable diving vacation, contact the travel department, Columbus Landings Service Co., Inc., P.O. Box 1492, Ft. Lauderdale, FL 33302. If you are in a hurry to obtain this information, you can call in the U.S., toll free, (800) 327-9473. Florida and Canada residents call: (305) 566-7441.

RED CARPET TO CAYMAN

In the February feature, Cayman, Colossus of Wall Diving, SKIN DIVER Magazine said that Red Carpet Airlines provides DC-3 flights from Tampa International Airport non-stop to Cayman Brac and Grand Cayman. Red Carpet does, in fact, offer the non-stop service, but it is aboard Convair 440's, *not* DC-3's.

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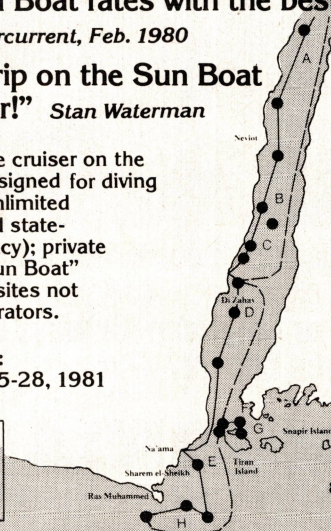
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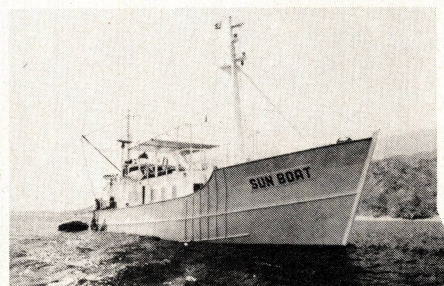
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FRINK PHOTO TOURS

The first in a continuing series of photo tours organized by Stephen Frink Photographic will take place November 15-30 in the Red Sea. A 96 foot live-aboard lux-



ury cruiser, the *Sun Boat*, has been chartered. Three to four dives per day, night dives, overnight Ektachrome processing, and some of the world's finest diving are featured in this 14 day tour.

For further information and space reservations, please contact Stephen Frink Photographic, P.O. Box 1907, Key Largo, FL 33037 or (305) 451-3737.

SCUBA BC

Five unique tour packages designed for scuba divers to explore the clear waters off British Columbia are available through Canadian Pacific Airlines and Pacific Western Airlines.

Ranging from a two day/three night weekender to a seven day/eight night tour package, the dive holidays are available now through mid-to-late May. Prices range from \$150.95 per person (double occupancy) for the weekender, to \$540 per person (double occupancy) for the seven day/eight night package (all prices in Canadian dollars).



Accommodations available on the diving tours include the Discovery Inn on Vancouver Island, Powell River's Beach Gardens Dive Resort complete with indoor pool, health spa and tennis courts;

Victoria's Empress Hotel situated on the edge of Victoria Harbor; the Brentwood Inn located near Vancouver's Butchart Gardens; and the Sheraton Landmark, a 42 story hotel with a revolving roof-top restaurant overlooking Vancouver.

For reservations or additional information contact CP Air's tour desk toll free at (800) 426-7000 or a travel agent. >>>

BONAIRE FILM RELEASED

Marine Graphics recently completed production of a new film which explores the underwater world of Bonaire.

Distilled to 15 minutes, *Bonaire My Love* captures the essence of diving this beautiful and secluded island. Fish feeding, reef exploration, night diving and deep diving highlight the film. Bonaire's conservation efforts and the island's natural beauty are shown.



Bonaire My Love is available for rental or purchase by dive clubs, conservation organizations or groups planning trips to Bonaire.

For more information on the 15 minute, 16mm color/sound film write Marine Graphics, Box 2242, Chapel Hill, North Carolina 27514. >>>

MONTEGO BAY TOURS

Rose Hall Inter-Continental Hotel and Country Club is promoting new scuba diving tours through April 30. The four day/three night and eight day/seven night packages are \$322-\$333 and \$583-\$611 EP per person, double occupancy for the two periods, respectively. The package includes three day and one night dives on the four day tour and six day and one night dives on the eight day tour.

Single, triple and extra night rates are available. Air transportation and meals are additional.

The 500 room Rose Hall Inter-Continental is a modern luxury resort, with a wide expanse of white sand beach, five lighted tennis courts, two swimming pools, 18 hole championship golf course, shopping arcade, fine restaurants and lounges and a lively nightclub in Montego Bay, the Hell Fire Club.

For more information, contact any travel agent or Rose Hall Inter-Continental Hotel and Country Club toll-free in the U.S. (800) 327-0200, toll-free in Florida (800) 432-2673, in Miami (305) 358-3680, and in Canada (416) 960-5200. >>>

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Also inquire about the Rick Frehsee School of Underwater Photography

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N.Y. STATE (800) 252-6323

CHUB CAY

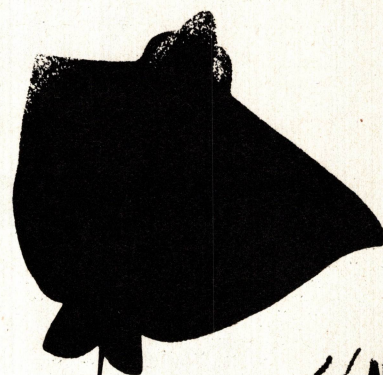
BAHAMAS

On Shore—Chub Cay Club offers every amenity for divers... a complete dive shop, dive boats & guides; a luxury yacht club, fine dining and island music; pleasant rooms with a harbor view and sparkling pool. Plus tennis, fishing, sailing and shelling... with miles of beach to roam.

Off shore—superb diving is just 5 minutes from dockside. Plunge 80' over Chub Cay Wall, home of eagle rays and schooling jacks; explore Canyons & Caves, a maze of cuts and caverns, teeming with tropical fish; or snorkel Mama Rhoda Reef, a forest of elkhorn & staghorn corals. Chub Cay is a Bahamas Port of Entry with sheltered marina for yachts & a smooth 5000' strip for private pilots and charter flights.

For information on Dive Programs
Clip the Coupon or Call:
Chub Cay Club (305) 861-4707

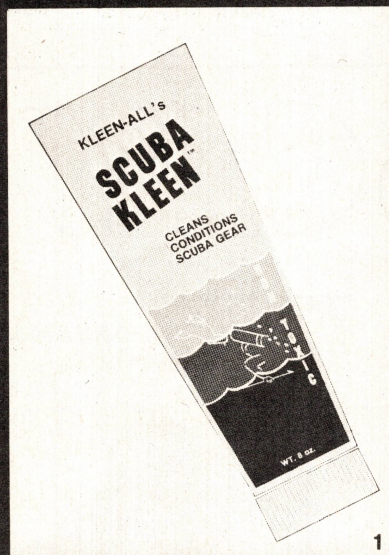
**"THE FISHBOWL
OF THE BAHAMAS"**



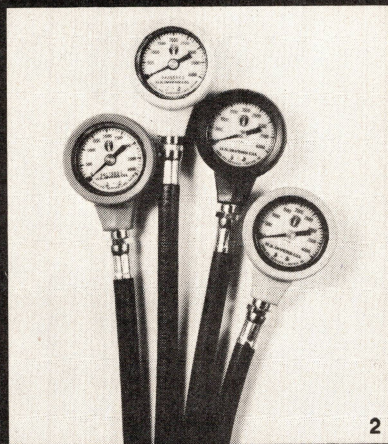
CHUB CAY CLUB
Box 661067, Miami Springs, FL 33166

Name _____ Address _____ City _____ State _____ Zip _____

New Gear



1



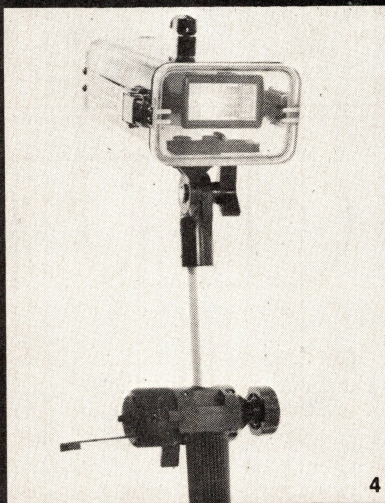
2

1 Scuba Kleen—The most recent addition to the line of cleaning gels offered by Kleen-All Products will clean and condition everything relating to diving. Scuba-Kleen is non-toxic and water soluble. Simply wipe on and wipe off. 8 oz. size \$7.98. Kleen-All Products, 5216 N.W. 5th St., Oklahoma City, OK 73127.

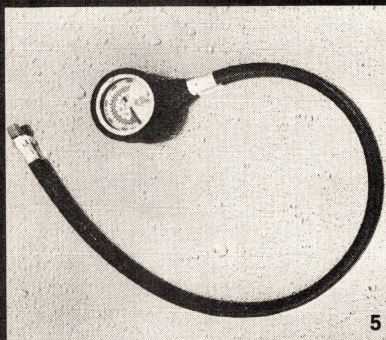
2 Submersible Pressure Gauge—Compact and easy to read, the Pro Dive I submersible pressure gauge comes with a spiral wound bourdon tube and a rubber boot available in black, blue, yellow or orange. Built for today's high pressure air fills the gauge has a maximum reading of 4000 psi. \$70 from U.S. Divers.



3



4



5

3 Dive Capsule Watch—This diver's timepiece features a pop-out capsule containing the working parts. This unit can be exchanged quickly anywhere in the world. Guaranteed to a depth of 130 feet, the watch comes in five models, from \$65.95 to \$69.95. From Time Unlimited, 17865 Sky Park Cir. #18K, Irvine, CA.

4 Quick Handle II—This strobe arm offers the same features as the Quick Handle I, except the ball socket has been replaced with a push button rotational adjustment. Push the button and the arm can be rotated and locked every 22.5 degrees. \$69.95, from Ikelite, 3303 N. Illinois Street, Indianapolis, IN 46208.

5 Submersible Pressure Gauge—Constructed of high-impact, long-life plastic, the gauge is extremely accurate to 3500 psi. Important features include a luminescent dial, spiral wound bourdon tube and a durable rubber boot. The dial is scaled to standard and metric readings. \$59.90. From Parkway, 241 Raritan, S. Amboy, NJ.



6



7



8

6 Ice Diving Harness—Professional style, constructed of 2 inch wide nylon webbing, 5000 pound test strength electro-polished stainless steel D-rings. Cross chest, waist and double crotch arrangement provides a comfortable fit and adjusts to a variety of body builds. Attaches to safety line snap hooks. \$18, from Dacor.

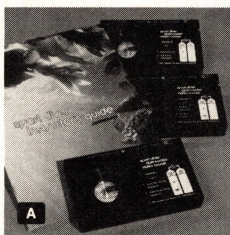
7 Baseball Caps—The new, smooth, white front panel allows for the sharp, clean reproduction of store, resort or club logos and is also ideal for messages. Reinforced adjustable headband and special sweatband. \$2-\$3.50, depending on the quantity purchased. The Impression Co., 3142 Wilshire Blvd., Los Angeles, CA 90010.

8 Dive Knife—The Diver's Companion is only five and one-half inches long with a 2 3/8 inch blade. It's small enough to be carried anywhere. It comes in two models, one with a thumb rest on one side of the blade and one model with two cutting edges. Constructed of unusually hard 440A stainless steel. \$28, from your Wenoka dealer.

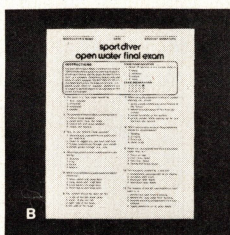
Learning Can Be A Puzzle Without All The Pieces

The Jeppesen Sport Diver Learning System helps you tell it all. The audiovisuals keep your students motivated to learn by giving that important overview. The manual presents all the need-to-know details. The workbook makes the student an active learner. The final exam gives that important learning review.

A. Open Water Video Course — Used to introduce subjects in the Jeppesen Sport Diver Manual. Available in ½" Betamax, ¼" VHS, or ¾" U-Matic video cassettes. Includes free instructor guide. Contains the same format as the Open Water Slide Course.

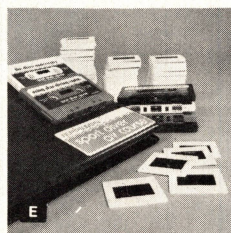


B. Final Exam for Open Water Course Includes 100 multiple choice questions covering the information in the Jeppesen Sport Diver Open Water Manual.



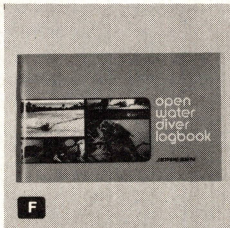
C. Open Water Certification Student Kit Includes the Jeppesen Sport Diver Manual, Workbook, and 4-color diploma. The Manual has 285 pages consisting of 433 illustrations and photographs. Workbook contains 336 questions.

D. Deluxe Open Water Certification Student Kit — Includes the Jeppesen Sport Diver Manual, Workbook, and 4-color diploma. The Manual has 285 pages consisting of 433 illustrations and photographs. Workbook contains 336 questions. Also includes Open Water Diver Logbook and 4-color No-Decompression Dive Table.

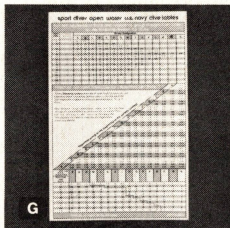


E. Open Water 35mm Slide A/V Course Used to introduce the subjects covered in the Jeppesen Sport Diver Manual. Contains 480 slides and 6 sound cassettes. Includes free instructor guide. Filmed on location on San Salvador Island.

F. Diver Logbook — Has 4-color cover and includes space to log 165 dives, training record, equipment purchased, equipment maintenance, and diving ailments broken down by causes, symptoms, treatment, and prevention.



G. Dive Table — Printed in 4 colors for no-decompression diving. Also includes memory jogger on the back. Printed on waterproof paper.



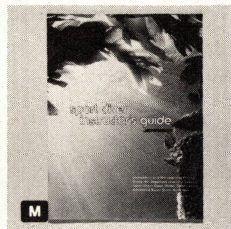
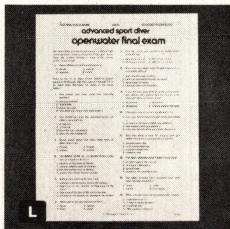
H. Revision Package for Open Water 35mm Slide A/V Course — For instructors and dive stores who already own the Jeppesen Sport Diver Open Water 35mm Slide A/V Course. This package contains three 80-frame slide sets and two sound cassettes. Updates courses purchased before January 1, 1980.

I. Advanced Open Water 35mm Slide Course — Completely coordinates with the Jeppesen Sport Diver Advanced Manual. Contains 480 slides and 6 sound cassettes. Includes free instructor guide. Filmed on location on Santa Catalina Island.



J. Advanced Open Water Student Kit Includes the Jeppesen Sport Diver Advanced Manual, Workbook, and 4-color diploma. Manual has 240 pages with 270 photographs and illustrations. Workbook has 547 questions.

K. Promotional 35mm Slide A/V Program Use this program to interest non-divers in the sport of diving. Includes 80 slides and one sound cassette.



L. Advanced Open Water Final Exam Contains 100 multiple choice questions covering the information in the Jeppesen Sport Diver Advanced Manual.

M. Jeppesen Sport Diver Instructor's Guide — A complete guide showing how to integrate the Jeppesen learning system into your current curriculum. Includes how and why humans learn, underwater instructor responsibilities, and the options available to teach the Jeppesen Learning System. Instructor Directed Activities are provided that can be used in the classroom, pool, and open water sessions.

Jeppesen materials are endorsed and distributed by ACUC, NAUI, PADI, SSI, & YMCA. Instructors and Dive Stores wishing to locate your closest distributor or to order direct, call toll free 1-800-525-7379.

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IMPROMPTU



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In private collections; numerous other sculptures throughout four continents.

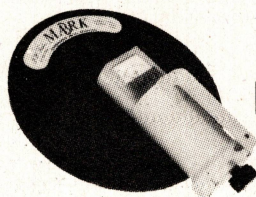
Size approximately 6½" x 5", weight approximately 18 oz. Total Edition 950. Price \$130.00, prepaid. Each piece hand signed and numbered. 30 day unconditional guarantee. Four weeks delivery. Checks, Master Charge and Visa accepted.

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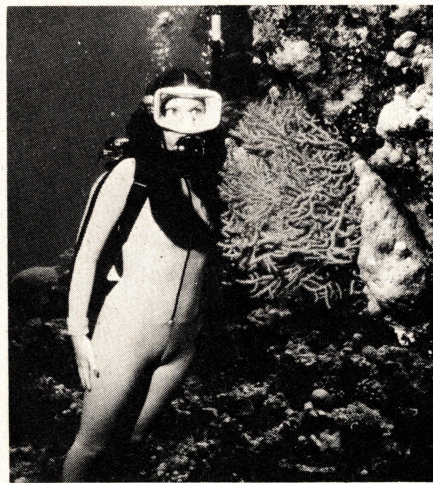
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SEE & SEA TO FIJI

See & Sea Travel's September 10-26 dive adventure in Fiji will be escorted by Carl Roessler.

This See & Sea program is offered in two one-week segments — first, a week



of spectacular diving at Rainbow Reef using a hotel and all-day boat diving; then a second week of unlimited diving on a live-aboard vessel at Astrolabe Reef. These programs are designed for the avid diver/photographer who is not satisfied with two dives per day.

For further information on these programs, contact See & Sea Travel Service, Inc. ☐

RUNAWAY BAY TOURS

New winter four day/three night and eight day/seven night Diving at Its Best package tours to Runaway Bay, Jamaica, are being offered through April 30. Air Jamaica is the cooperating carrier.

Priced at \$344 and \$654 MAP per person, double occupancy for the two periods, respectively, the packages include: accommodations in Club Caribbean's charming thatched-roof cottages, round trip airport transfers, breakfast and dinner daily, six dives on the four-day program and 12 dives on the eight-day program including boat, use of tanks and weights, air fills, diver's Jamaican T-shirt, and more.

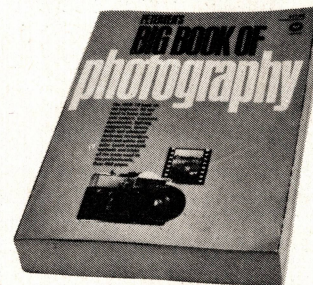
Single, triple and extra night rates are available as are group rates for 16 or more persons. Additional dives are \$15 each and a night dive is \$25.

Cost of the packages for non-diving partner sharing diver's room is \$254 for four days/three nights and \$464 for eight days/seven nights.

For more information, contact any travel agent, Air Jamaica, or the tour operator, Weekends Away Travel, 6015 Garfield Street, Hollywood, FL 33021, telephone toll-free (800) 327-9543; in Florida (305) 983-8434; in Dade County (305) 625-0734. ☐

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PRINCETON TECTONICS

COMPACT DEPTH GAUGE-DG-10™

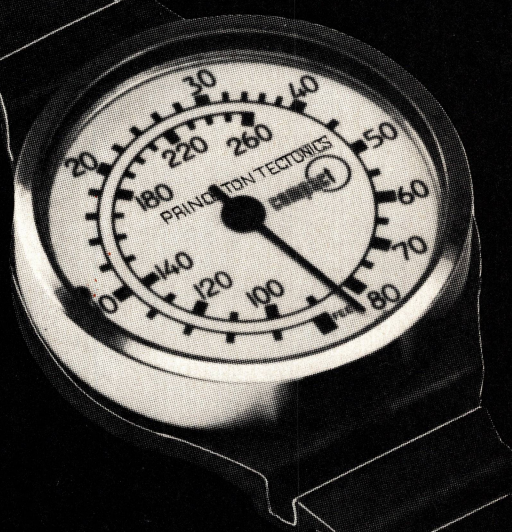
In our continuing endeavor to supply the diving industry with high quality, reasonably priced equipment, Princeton Tectonics is pleased to introduce our own depth gauge.

The PRINCETON COMPACT DEPTH GAUGE is the first in a series of gauges. The COMPACT is designed and built for the demanding diver and as with other Princeton Tectonics products, any maintenance repair work will be performed at our plant, assuring *prompt* service and meticulous technical back up.

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The new PRINCETON TECTONICS watches have been designed with an eye to use, reliability and looks. Pictured here is the TEC 660 & 660W which share the following features with all the new Princeton Tectonics watches: Scratch resistant mineral crystal / Quartz movement / One-way ratchet-bezel with locking stops / Recessed screw-down crown / Five year limited warranty / Stainless steel bracelet / Water resistant to tested depths (TEC 660's are tested for 660 ft. – other models vary). Finally, all PRINCETON TECTONICS watches will be repaired and serviced at our own plant – assuring *prompt* and meticulous technical back-up.



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New from PRINCETON TECTONICS, the BL-1000 BOTTOM LIGHT is a compact, rugged and dependable light source for divers. Featuring a unique locking slide switch which does not penetrate the case, BOTTOM LIGHT incorporates several engineering innovations that make it the best buy in small diving lights today.



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MICRONESIA PHOTO SAFARI

Don Peterson, an underwater photographer known primarily for his freshwater work, has agreed to act as tour leader for Sea Safaris' November Truk/Palau tour.



An active member of the dive industry from the Midwest, Peterson is a co-owner of Aquasports in Springfield, Missouri and currently is instructing hundreds of students in diving and underwater photography every year. Peterson has also been the recipient of NAUI photo contest awards three years in a row.

Departure date for Micronesia is November 13. The tour includes both Truk and Palau and offers an optional extension in Ponape. Emphasis is going to be on photography, with photo coaching for both the beginning and experienced photographer. Film processing is going to be offered on both Truk and Palau.

Sea Safaris can only accept a limited number of persons for this tour. By contacting the dive tour service at 3701 Highland Avenue, Suite 304, Manhattan Beach, California 90266 or by calling (213) 546-2464, more information can be acquired concerning this safari.

BOOKING AGENT

Caribbean Adventures Ltd. has been appointed booking agent by the Brac Reef Hotel, Cayman Brac.

The Florida-based wholesaler also handles bookings for the Buccaneer's Inn, also located on Cayman Brac and makes diving arrangements for visitors with Brac Aquatics, dive operator for both the Buccaneer's Inn and Brac Reef Hotel.

Caribbean Adventures offers several winter packages as follows:

For the Buccaneer's Inn, vacation packages from three nights for \$163 to nine nights for \$489 and dive packages from three nights for \$263 to nine nights for \$789, per person double occupancy AP.

Packages include room, all meals, maid service, gratuities and hotel taxes, round trip airport transfers and unlimited diving on the diver's package, including some night dives. Certain options are

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also available, including car rental, fishing and sightseeing tours.

For the Brac Reef Hotel, daily rates are from \$58 to \$68 single, \$65 to \$75 double and \$74 to \$84 triple, EP. For MAP plan, add \$20 per day per adult, \$12 per child; for AP plan, add \$25 per day per adult, \$15 per child. Daily diving rates are \$39 per diver and include morning and afternoon boat dives, unlimited beach dives and a night dive. Facilities include tennis courts and swimming pool. Round trip airport transfers are included. Package options available at nominal additional fees include rental car and sightseeing tours.

Caribbean Adventures also accepts bookings for the following Grand Cayman properties — the Grand Caymanian Holiday Inn, the Cayman Islander Hotel, the Royal Palms Hotel, the Beach Club Colony Hotel, the Coral Caymanian Hotel and Sunset House.

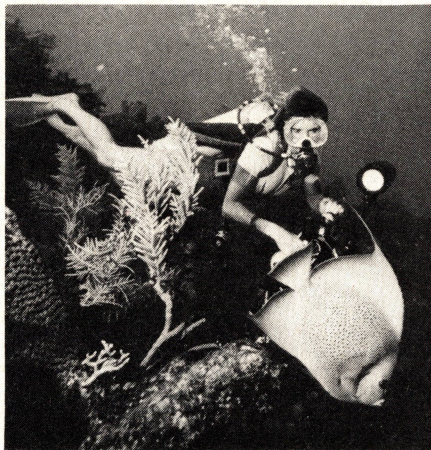
For reservations and further information, contact Caribbean Adventures Ltd., P.O. Box 685, Land O' Lakes, FL 33539 or phone nationwide toll-free (800) 237-3803, toll-free in Florida (800) 282-9178, in St. Petersburg (813) 823-5686; in Tampa (813) 996-4999.

CAYMAN PHOTO SEMINARS

Nancy Sefton has recently launched a series of underwater photo seminars

geared especially to dive groups visiting the Cayman Islands.

Scheduled at a time and place convenient to any group, the seminar package includes two evenings of slide-lectures and a roll of slide film processed overnight and critiqued. An added option is a group underwater photo coaching session.



Sefton has designed her package to cover the basics, helping new, as well as experienced photographers get the most out of their Cayman dive trip. An expanded slide seminar, which participants may opt for, includes a third evening devoted to a reef overview, so that photographers may better understand

Caribbean reef creatures and how best to capture them on film.

Nancy Sefton is a ten year resident professional photographer in the Caymans. Her work has appeared in SKIN DIVER, Oceans, Sea Frontiers, Time-Life TV Books, Reader's Digest, and *World Book Encyclopedia*. She is the author of *Marine Life of the Caribbean* (Macmillan) and of the recently published *Dive Cayman!*

Dive group leaders interested in scheduling their own Cayman Photo Seminar may obtain additional information by writing air mail to: Nancy Sefton, PO Box 1200, Grand Cayman, British West Indies.

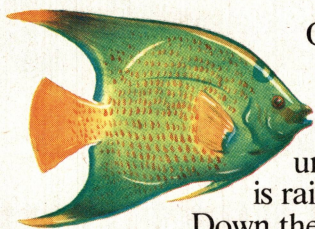
JACOB'S WELL CLOSED

The February issue of SKIN DIVER contained an article on Jacob's Well in Texas. It has been learned since the article was published that diving is no longer permitted in the well.

Several people have died in the well. Last year, Don Dibble of The Dive Shop in San Marcos, installed a grate across the entrance to the most dangerous tunnels. The grate was designed to prevent future deaths. But, according to the Hays County Sheriff's Department, that grate has been destroyed by vandals.

The Sheriff's Department patrols Jacob's Well and will file charges against trespassers.

FAMOUS WATER COLORS.



Off the Mexican island of Cozumel, one hundred foot visibilities are not unusual. And the underwater scenery is rainbow colorful.

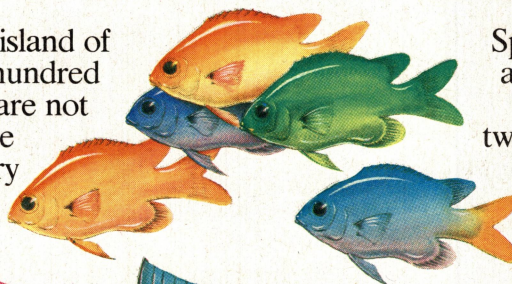
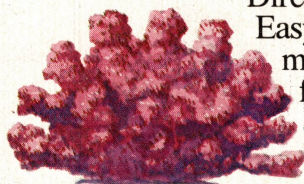
Down the near vertical drop of Palancar Reef spill pink, red and rare black coral.

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OUR WORLD-UNDERWATER XI

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Al Giddings



Sylvia Earle

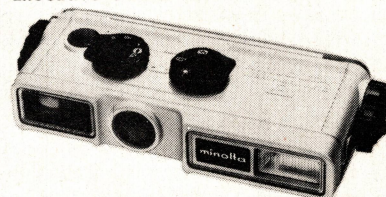
Witness, first hand, a sunken city with artifacts and treasure dating back to the 1700's. The drama will increase as a pot-pourri of experiences unfolds before your eyes.

The Our World-Underwater Seminar and Film Festival will be held at Chicago's famous Civic Opera House, 20 North Wacker Drive.

Highlights will include outstanding films by Al Giddings, *Treasure of the Mercury Wreck* and *Great White Shark*. Dr. Sylvia Earle will take you on a completely new adventure, a lock out at 1200 feet in the revolutionary JIM Suit. Sir Robert Marx will be a featured speaker as well.

The Scholarship Banquet will be held at 5:00 pm Saturday, at which time a new winner will be announced. Members of the Scholarship Committee will be on hand to award the \$5,000 Scholarship and Stacy Tighe will describe her experiences as last year's recipient.

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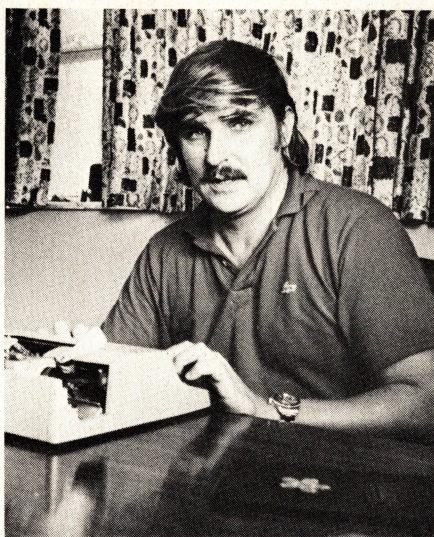
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VIRGINIA EGG HUNT

Underwater Outfitters, Ltd. and the Virginia Easter Seal Society will co-sponsor the second annual Underwater Easter Egg Hunt Benefit Dive here Sunday, April 12, at Smith Mountain Lake. Nearly \$3,000 in prizes will be awarded to divers finding the brightly colored eggs hidden among wrecks and pier pilings.

A \$5 entry fee will be charged to all entrants and all proceeds from the day-long event will be contributed to the Virginia Easter Seal Society for research. Last year's inaugural event drew divers from as far away as South Carolina and Pennsylvania.

The prizes will be donated by Underwater Outfitters, local merchants, and various dive equipment manufacturers.

The dive/hunt will be held in a protected cove near Saunders' Marina on Smith Mountain Lake, where April visibility runs about 10-15 feet. Water temperature requires the use of a full wetsuit.

Divers will be limited to one egg each, ensuring at least 100 winners. Buddy teams must stay together and any diver surfacing with less than 500 psi of air in his tank will be disqualified. No eggs will be hidden in more than 30 feet of water. All prizes will be awarded during ceremonies at the end of the dive.

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Scuba Quiz

Category: Inflatable Boats

By Dennis Graver

Inflatables are popular boats offering many features particularly suited to the needs of divers. There are some differences between inflatable boats and conventional boats and divers should be aware of these. Check your knowledge of inflatables by taking this month's quiz. The answers are on the next page.

1. Which of the following is not an advantage with an inflatable?

- ☐ A. Portability
- ☐ B. Stability
- ☐ C. Rides high in water
- ☐ D. Ease of storage

2. Which of the following problems is most likely to occur when launching an inflatable boat through several feet of surf?

- ☐ A. The surf breaks over the bow and floods the boat
- ☐ B. The surf turns the boat sideways and overturns it
- ☐ C. The bow of the boat rises up and it flips over backward
- ☐ D. The boat is turned around by the surf and pushed to shore

3. An inflatable boat has _____ stability than/as a standard V-bottom boat of comparable length.

- ☐ A. More
- ☐ B. Less
- ☐ C. About the same

4. During collisions with rocks, piers, and pilings, an inflatable boat will sustain _____ damage than/as a standard hard-hulled boat of comparable size.

- ☐ A. More
- ☐ B. Less
- ☐ C. About the same

5. Select the true statement concerning the anchoring of an inflatable.

- ☐ A. A light anchor is sufficient and recommended owing to space limitations
- ☐ B. A light anchor is adequate, but greater scope should be used than with a standard boat
- ☐ C. Use the same size anchor and the same scope as would be used for a standard boat of the same size
- ☐ D. Use the same size or heavier anchor and more scope than would be used for a standard boat of the same size

6. The preferred and recommended entry from an inflatable boat is a:

- ☐ A. Giant stride
- ☐ B. Forward roll
- ☐ C. Sitting back roll
- ☐ D. Side straddle roll

7. If the pontoon of an inflatable boat is punctured:

- ☐ A. The boat will be supported by other flotation compartments
- ☐ B. The self-sealing feature will quickly stop the loss of air
- ☐ C. It will be very difficult or impossible to move the boat in the water
- ☐ D. The entire boat will deflate and sink

8. Select the correct method to get into an inflatable boat from the water:

- ☐ A. Climb in over the side with all gear in place
- ☐ B. Remove your scuba tank and hold onto it while climbing into the boat
- ☐ C. Attach tank and weightbelt to a gear line, then climb into the boat
- ☐ D. Have your buddy hold your tank and weightbelt while you climb into the boat

9. An inflatable boat requires _____ maintenance than/as a standard boat of comparable size.

- ☐ A. More
- ☐ B. Less
- ☐ C. About the same

10. The optimum way to store an inflatable boat is:

- ☐ A. Completely deflated and folded
- ☐ B. Completely deflated and unfolded
- ☐ C. Assembled and fully inflated
- ☐ D. Assembled and partially inflated

Scuba Quiz

Answers: Inflatable Boats

1. C. Rides high in water. With a shallow draft and light weight, an inflatable boat is affected by wind and waves more than a standard boat would be affected. Be alert to the effects of wind when launching, maneuvering, or anchoring an inflatable. An example of a possible problem is a diver trying to catch a drifting inflatable that is being blown across the water faster than the diver can swim.

2. C. The bow of the boat rises up and it flips over backward. Because an inflatable is light and sits high in the water, it is important to control the bow during surf entries. If the surf is more than two-three feet in height, the boat should be launched elsewhere or the dive aborted. Be sure to secure everything in the boat well for surf entries and exits.

3. A. More. The round air compartments on the sides of inflatables provide excellent stability. As weight on one side is increased, the displacement on that side increases greatly and that side is lowered only slightly. It is quite possible for two divers to sit on the same side of an inflatable with no danger of it overturning.

4. B. Less. An inflatable boat will quite often simply bounce off obstructions that would seriously damage a hard-hulled craft. The heavy, coated material from which good inflatables are made is tougher than many people realize. Actually, inflatables are quite durable, hold up well and repair easily. This does not mean you should be reckless, however.

5. D. Use the same size or heavier anchor and more scope than would be used for a standard boat of the same size. Because an inflatable is affected more by surface wind than a conventional boat, it is important to make certain the boat is well anchored. The amount of anchor line used should be equal to five times the depth of the water.

6. C. Sitting back roll. Inflatables are low, stable platforms. This is exactly the situation in which a sitting back roll should be used. Simply sit on a pontoon, be sure the entry area is clear, and roll backward into the water. Keep your center of gravity low when moving about in an inflatable.

7. A. The boat will be supported by other flotation compartments. Nearly all inflatables have multiple air chambers. This provides safety via flotation in the event of a leak in one of them. Some of the better boats have inner air chambers that function as a boat within a boat. Should the outer chamber be damaged, the inner chamber provides flotation and support.

8. C. Attach tank and weightbelt to a gear line, then climb into the boat.

While it is fairly easy to pull yourself into an inflatable, heavy equipment should be removed first. Gear lines hung over the side with clips attached simplify the operation. Be sure to pull the lines aboard before getting underway.

9. B. Less. One of the advantages of an inflatable is its low maintenance. A thorough rinsing after use is about all that is required. Floor boards may need some occasional attention. With proper use and only moderate attention, an inflatable boat can provide many years of service.

10. D. Assembled and partially inflated. Creases are harder on the boat fabric than no creases. Storing the boat fully inflated keeps the material under stress and can stretch the fabric. Parts are easier to assemble when they remain assembled most of the time.

I hope you scored well, particularly if you own or dive from an inflatable boat! No matter what type of boat you use for diving, be sure to take a boating class from your local Power Squadron or Coast Guard Auxiliary. Also, always remember to file a float plan with someone not going along when you go out in a boat.

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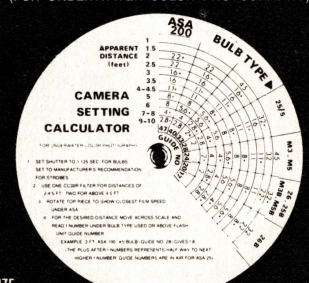
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DIVERS SAVE LIVES

The New Jersey Council of Diving Clubs presented special awards of recognition for two separate life-saving acts of heroism by members of the New Jersey scuba diving community. Nelson Sousa, Keyport, New Jersey, received his award for saving the life of a six year old boy who had fallen through thin ice. In addition, Roger Muszynski, Hillside, New Jersey, and Art Karin, Keyport, New Jersey, received awards for their open water rescue of two victims of a boat sinking several miles at sea.



Art Karin, Nelson Sousa, Lee Ward, council president and Roger Muszynski.

On December 19, 1979, Sousa just happened to be passing by moments after a young boy had disappeared through thin ice. Sousa had one piece of dive equipment with him — his drysuit. The boy had been underwater for something in excess of ten minutes when Nelson Sousa surfaced with his body. The boy showed no signs of life for 20 minutes during resuscitation efforts. However, this six year old boy recovered and is alive and well today.

In a separate incident on June 16, 1980, Roger Muszynski and Art Karin were returning from a weather-aborted check-out dive for new students when they received an emergency broadcast from the Coast Guard. A fishing vessel had sunk off Sandy Hook, New Jersey, with six persons on board. A short time later, two people were seen floating in the water. In spite of continually mounting seas, Roger and Art entered the water and kept the victims afloat, applying mouth-to-snorkel resuscitation until the Coast Guard arrived. Unfortunately, two other fishermen were lost at sea and one of the men rescued by Roger and Art died later. However, their commendable action saved a life.

The awards were presented to Nelson, Roger and Art at the New Jersey Council of Diving Clubs' fourth annual symposium, held at Rutgers University.

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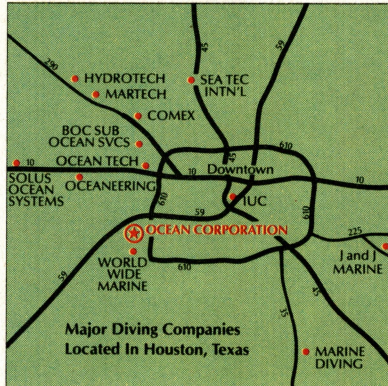
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Why Houston?

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The Ocean Corporation is located in Houston and more commercial divers are hired in Houston than in any other place in the world. Twelve diving companies are located in Houston including three of the four largest in the U.S. Many others are located in the nearby New Orleans area. The demand for divers is so great in Houston that large locally based diving companies like Ocean Systems, Hydrotech Systems, Martech International and Sea Tech International have hired many of our students for part-time work while they were attending school. Over 90% of our recent graduates went to work for these and other local diving companies when they completed our program. Houston is the place where the action is...the commercial diving, offshore construction and oil industry capital of the world.



BECAUSE

The Ocean Corporation is a commercial diving company, not just a school. Our facilities, equipment and training aids are the best, and our diving systems are as up-to-date as possible... because much of the equipment is used by our diving operations division to perform actual diving contracts in the field. Ocean Corporation has successfully completed many underwater jobs for various industrial clients over the years... including specialized underwater inspections, maintenance and repair work. For example, we did the world's first commercial underwater repair job in a nuclear power plant. And most of our divers have been graduates of our own school.

BECAUSE

The Ocean Corporation is a convenient and exciting place to go to school. Houston is one of the fastest-growing and most dynamic cities anywhere. It is a city of expansion, energy and youth (the average resident's age is in the mid-20's). Houston offers every conceivable kind of entertainment, from sports events, ultra-modern discos and open-air theater to rough-house local rodeos, chili cook-offs and the new Texas-size



country-western dance clubs. Reasonably priced adult and singles apartments are readily available within walking distance of the school, and fast-food to luxury restaurants are nearby. The semi-tropical climate is wonderful, the sport diving is great and the folks are friendly.

BECAUSE

The Ocean Corporation management and instructor staff have long-term experience in the international offshore oilfield diving business. Retired ex-military divers and sport scuba divers don't run the school...commercial divers do. For example, the President of The Ocean Corporation, Larry

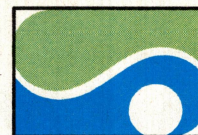
Cushman, was Vice President and Europe/Africa Area Manager for Ocean Systems, Inc. for three years...with responsibility for all North Sea diving and underwater construction operations. He also worked six years as a manager for Oceaneering International, Inc., another of the world's largest commercial diving contractors. Ocean Corporation managers and instructors know today's diving business...first-hand, from recent experience.



The Ocean Corporation

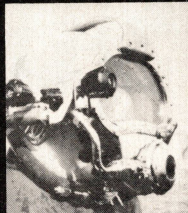
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DIVERS ACADEMY

(Continued from Page 45)

work. This type of work is more geographically stable but does not carry the financial rewards of other types of diving. Offshore work, the choice of many graduates, entails traveling to the Gulf of Mexico and even remote spots overseas. Bill Brown keeps a detailed chart at Diver's Academy on offshore drilling directly off the coast of New Jersey. As more oil and natural gas wells start to produce, students won't have far to go to look for jobs. Brown is able to place most of his students, if they are willing to travel and have shown they are serious about entering the dive profession.

The diver's training takes about 14 weeks. During this time the student becomes very familiar with dive physics, physiology and decompression theory. A solid foundation in these areas is a must for commercial divers and the first two weeks of classroom work are devoted to these subjects.

Next comes familiarization with the classic commercial diving dress, the Navy Mk V. This is the combination of canvas suit, weighted shoes and large, heavy helmet universally recognized as the business suit for working commercial divers. It is still in popular use in most parts of the world; a thorough grounding in its use is mandatory for a prospective professional diver.

After the Mk V introduction, other equipment is introduced. In addition to a full review of scuba skill so extensive that basic certification is not required for entry to the course, other surface supplied equipment is introduced. Japanese equipment, Desco rigs, and Kirby Morgan masks are but a few of the lighter, newer models that are studied, repaired and used. Students learn not only to break down and repair equipment, but they also use it underwater to handle lines and perform light salvage techniques. The students also use wrenches and other tools and cut and weld. The main idea is to get the student acclimated to the new equipment to the point where gear is second nature; the job at hand becomes the challenge. This theme is repeated often: Diving is only the vehicle that gets you to the work site.

The course at Diver's Academy of the Eastern Seaboard includes a total of 420 hours of instruction. This is broken into about 180 hours of classroom instruction and about 240 hours of practical instruction. The diver will average more than 50 dives during this period, all carried out under the supervision of one of the training instructors. The divers not in the water act as tenders and support

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personnel for their classmates, so waiting time is devoted to learning topside skills that enhance the marketability of the diver.

The training instructors draw on a wealth of personal professional dive experience. Mike May, for example, has a Navy diving background that reaches back to 1964. He continued with the Navy as a dive instructor and trainer until he retired in 1980 to join the staff at Diver's Academy. Mike has also done a lot of commercial jobs, specializing in harbor and maintenance work. Harold Eikhorn, on the other hand, came up from the private sector of diving. Starting with a basic course in 1960, Harold continued his dive education with a marine biology degree, attended commercial diving school, and worked in Louisiana and Brazil as a commercial diver. He also has a lot of experience in surface support for mixed gas diving and saturation work. Dr. Walter M. Comiskey, a physician with a special interest in hyperbaric medicine, conducts many of the physiology lectures. There are also other instructors the average class of 10-14 students can call upon for assistance in any of the welding, salvage, or photographic projects in which they are involved.

The program at Diver's Academy is an intense, highly personalized one. Class size is small, and although students come from all over the U.S., everyone is soon friends as the work begins. Sharon Brown, office manager, reports that housing is available on a limited basis for out-of-town students. The school starts a new class every month, so classmates often learn from each other while studying together. The school has also recently earned its accreditation from the National Association of Trade and Technical Schools, making it only the second diving school in the country to do so. This N.A.T.T.S. accreditation should pave the way for students to obtain funding from various sources for tuition. Anyone wishing more information about Diver's Academy can call or write: Diver's Academy of the Eastern Seaboard, 2500 Broadway, Camden, New Jersey, (609) 966-1871.

QUABBIN CORRECTION

SKIN DIVER Magazine published a 24 page guide to Cayman wall diving in February, 1981. On the chart entitled, Dive Operators of the Cayman Islands, an incorrect address was listed for Quabbin Dives (Cayman) Ltd.

For up-to-date information on the dive services of Quabbin, please write to the correct address: P.O. Box 157, Grand Cayman, B.W.I. We apologize for any inconvenience this has caused our readers or this fine dive operation in the Caymans.



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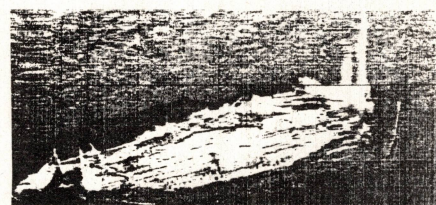
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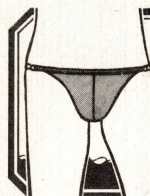
GREAT LAKES TREASURE SHIP FOUND

The barque *New Brunswick*, which sank 122 years ago, has been located in Lake Erie by special scanning sonar equipment. The 128 foot vessel was carrying a cargo of black walnut lumber.

Jim Kennard, an electronics engineer from Fairport, NY, located the wreck using a sophisticated sidescan sonar. He designed and built it with the addition of a special sensor called a "towfish," de-



veloped by Klein Associates of Salem, NH. When towed behind the boat the towfish bounces sonic impulses off the bottom, giving a printed image of everything lying on the bottom of the lake. Kennard, who has located over 100 shipwrecks over the years, was part of an expedition team put together by Mike Dilts of Lambeth, Ontario, owner of Saugeen Exploration and Salvage. Dilts owns the salvage rights to the *New Brunswick*.



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QUEEN CONCH

Dr. Edwin S. Iversen, professor of marine biology at the University of Miami's Rosenstiel School of Marine and Atmospheric Science, and Dr. Scott E. Siddall, research associate at the school, are developing techniques for mass-rearing queen conch (*Strombus gigas*), a mollusk prized by Bahamian and Caribbean islanders and shell collectors.

Researchers in marine laboratories of the region have been studying the biology of the species to determine how to propagate it in large numbers. In Venezuela in the early 70's and more recently in Turks and Caicos, individual conch larvae were brought through metamorphosis, changing from larvae to juveniles in the laboratory, but problems arose when attempts were made to produce juveniles in large numbers.

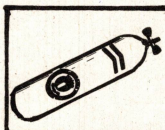
A year ago, the Wallace Groves Aquaculture Foundation of the Bahamas instituted a two-pronged attack on the problem with Drs. Iversen and Siddall at the Rosenstiel School. The school pioneered studies 15 years ago that have led to mass culture of shrimp (*Penaeus duorarum*).

The work of Drs. Siddall and Iversen indicates that soon it will be possible to produce great numbers of young conchs in a hatchery and raise them to marketable size in shallow-water pens or release them to restock severely depleted natural populations.

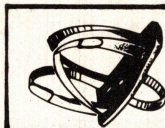
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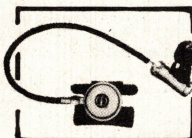
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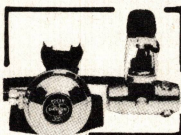
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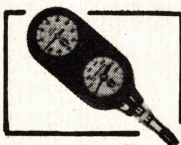
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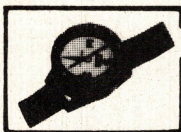
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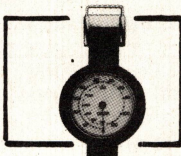
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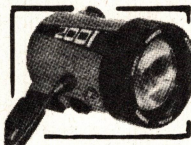
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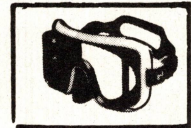
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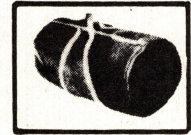
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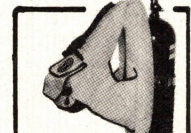
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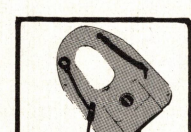
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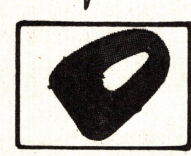
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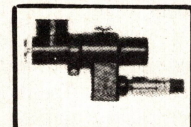
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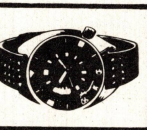
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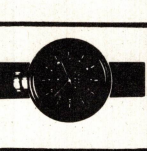
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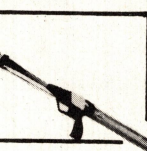
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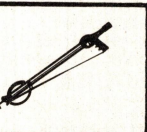
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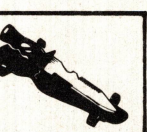
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TECHNIFACTS

(Continued from Page 48)

on which work is to be done. Study these drawings thoroughly to become familiar with all external fittings, openings, intakes, outlets from pumps, nature and location of all propellers, thrusters, rudder(s), cathodic protection systems and anything else that might affect the safety of the diver or performance of the work.

The supervisor of the dive operation should, before allowing the diver to work in the water, contact the master of the vessel (or the duty officer if the master is not on board) and make him aware of the fact that a diver is about to start work on the underwater part of the hull. Ask him to designate a responsible person in the engineering department, either the chief engineer or one of his assistants, to see to the safety of the diver while he is in the water. All systems that, when operated, might be capable of causing injury to the diver should be tagged out, *Do Not Operate - Diver In The Water*. Equipment to be tagged should include propulsion equipment (shaft and propeller), steering equipment, (rudder), various suction and discharge pumps, impressed current type cathodic protection systems and, if on military ships having very powerful sonar systems, the control for those. Go over all these with the engineer; discuss these and any other potentially hazardous sources and tag them appropriately.

The duty officer should have hoisted the appropriate visual signal, code pennant Alpha, or other signal from the International Code of Signal book, warning all ships and boats in the area to keep well clear and to pass at slow rate of speed. Small boats servicing the larger vessel should not be permitted to operate while hull cleaning is in progress.

When the above has been accomplished the diver can proceed with the work. Intakes, even relatively small ones, when in operation, are potentially hazardous because they exert enough suction (when added to the pressure of the water at depth) to cause suffocation when a diver is pulled against them.

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The primary purpose of the hull cleaning equipment is to mechanically remove marine growth and to rejuvenate existing anti-fouling paint by removing the deteriorating outer layers. Large, multibrush units are used to clean most of the hull with smaller, single brush rigs used on propellers, shafts and other small areas.

There are several brands, and even more sizes, of hull cleaning machines in use. Some of these are air driven, some are hydraulic, and some are electro-hy-

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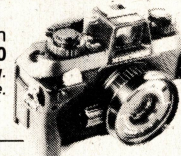
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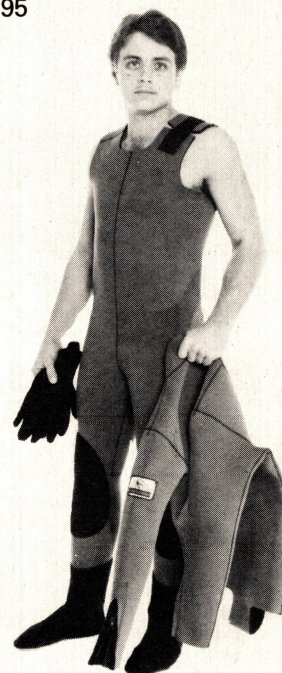
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TECHNIFACTS

draulic. All, when properly operated, are basically self-propelled and the diver serves primarily to control the on/off mechanism and to steer the machine along the hull. Both diver and scrubbing unit are neutrally buoyant or, when working along the flat bottom, a few pounds positive. The design of all brush systems is such that they will be held tightly against the hull when in operation by the suction of the water.

The Aquaclean, sold by George Wilson of Underwater Tools and Engineering, Orange, California, is an air driven unit requiring about 100 cfm of air at 100 psi pressure over bottom pressure. It is a single brush machine and is suitable for cleaning hulls with all stages of fouling.

Sub Enterprises, Inc. makes a unit (in three sizes), the Hydro Brush, that is small, hydraulically powered, handheld and good for all stages of fouling. This company also makes the Brush Sub which reportedly works best on Stage I and Stage II fouling. The Brush Sub requires a hydraulic power pack of about 1500-2000 psi pressure. It is a large, heavy (out of the water) unit which the diver rides while manipulating the controls.

Another hydraulically operated machine is a six foot diameter multi-brush unit having three or more brushes in the scrubbing unit. This unit, called Scamp, is owned by Seaward Marine who has all North American rights to the equipment. The popular Scamp machine (made by Winn in Scotland) works well on all stages of fouling. This unit is electro-hydraulically operated. Scamp also has hydraulic steering. It is a large unit, weighing about 1500 pounds out of the water but has about seven pounds positive buoyancy in the water.

Brushes for these machines are reportedly interchangeable but do require some modification. Brushes are made of several materials including polypropylene, bristle and wire of various stiffness and size. Experienced divers recommend using the softest brush that will clean the fouled hull. Primarily, this is to reduce to a minimum the damage to the painted surface of the hull.

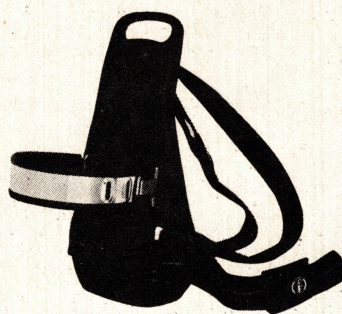
CLEANING TECHNIQUE

The basic technique of operating a hull cleaning brush, whether driven hydraulically or by air, is quite similar to that of operating a conventional, large size, floor polishing machine. To become familiar with the feel of hull scrubbing machines, practice with a large floor polishing machine — topside naturally. Learn what a rotating brush will do with various degrees of canting or tilting, with various degrees of pressure and with different

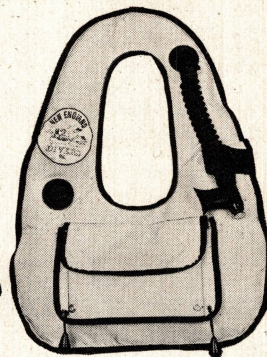
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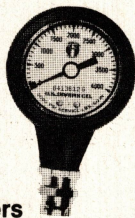
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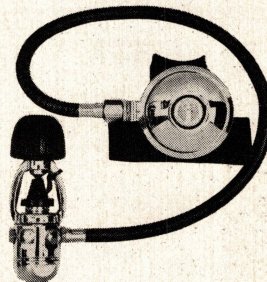
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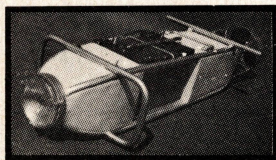
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TECHNIFACTS

operating speeds. Slope or cant the brush at various angles and with different pressures on flat, curved, smooth and rough surfaces. Note the differences in handling. Also, be aware that a circular brush when canted cleans only a part of its total diameter. The actual amount cleaned depends on the tilt of the brush.

After all safety precautions have been taken, clean as much of the hull as possible with the brush. In order of priority when cleaning time is limited, clean the propeller, then the forepart of the hull (from the bow to the run-of-the-hull) the stern area from the water line to the keel, the sides and finally the bottom.

Start cleaning an assigned area in the forward part, preferably from the bottom of the hull up toward the water line, and work in a fore and aft direction. Each pass with the brush should just overlap the previously cleaned section. Use the torque of the machine to pull both you and the machine along the cleaning path. The machine will perform about 80 percent of the work with the diver doing the other 20 percent, primarily in steering and controlling the power to the machine. Do not over cant (tip) the machine. To do so causes the brush to burn off paint or the edge of the machine to gouge into the paint.

Clean all of the hull that is possible with the large, multibrush unit. The balance must be cleaned either by smaller single brush units or by hand. Usually it is best to hand clean around intake and discharge strainers (with pumps down), any cathodic protection systems, and some sonar transducers (check with vessel's engineering department for transducer cleaning recommendations). Zincs used by ships for some of their cathodic protection can be cleaned with machines. A high pressure water lance can be used to effectively remove fouling organisms for about six feet into water intakes and outlets.

JOB POSSIBILITIES/PRICES

The primary market for the hull cleaning of ocean going vessels is probably in military vessels (including the hulls of submarines), tanker fleets and some of the faster merchant vessels. Also, many of the larger fishing fleet vessels have found it profitable to clean their hulls rather than drydock so frequently. Some smaller boats that must operate day-after-day with almost no chance for dry-docking, such as those catering to the tourist trade in coastal and harbor tours, are good candidates for a hull cleaning company.

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and support personnel; cost of operating the equipment used (trucks, communication gear, dive platform — boat, barge, or truck mounted equipment working from a dock — dive gear and scrubbing equipment); cost of office (advertising, clerical, bookkeeping, and insurance — liability and workman's compensation insurance are both very high when working underwater). These costs must be balanced against the amount of work you, as a diver, can perform in a day; or that the dive team together can perform.

As with any other dive operation — perhaps more than in most — this type business or operation must be carefully planned if it is to succeed. Consult with an accountant and an attorney to determine the best type of business to establish. Have the accountant help balance potential costs of *everything* with income you must generate to be successful. Survey the market potential for hull cleaning within the areas you can economically work.

A lot of divers and businesses performing hull cleaning are successful. A lot of others have failed. Plan carefully, work efficiently and safely, do a good job and charge a fair price for your work — and for a fair profit — and this type operation should be successful. ➤

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For additional information contact Jere Hallenbeck, Executive Director, Science Education Afield, 1425 Erie Boulevard East, Syracuse, NY 13210, or call, in New York State (315) 479-5544; all other states (800) 448-5521. ➤

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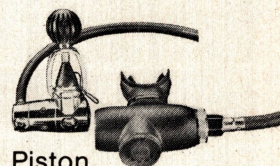
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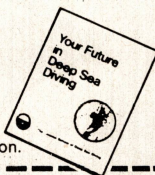
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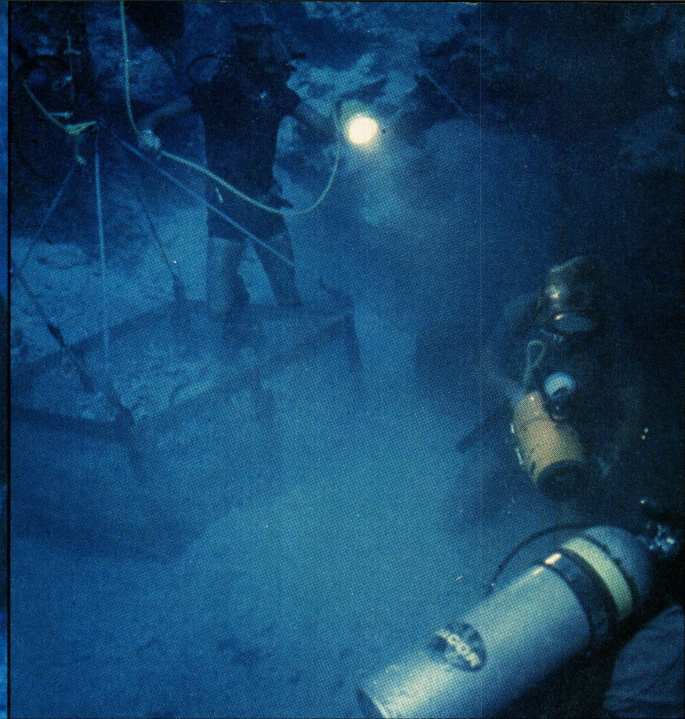
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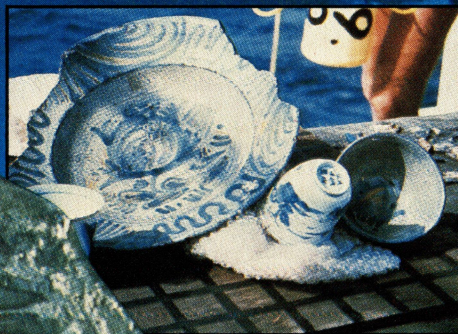
Diving for sunken treasure with the Dacor Pacer.

3000 hours of trouble-free operation under the most demanding conditions.



The Dacor Pacer has undergone many tests under all types of difficult diving conditions. However, no test we know of can match the gruelling treasure hunt and salvage of the Spanish Galleon, "Concepción". Broken up on a reef off the Dominican Republic in 1641 where it went to its watery grave, it was one of the richest discoveries of modern times.

The Dacor Pacer was selected as the official regulator of the expedition by its leader Burt Webber and dive master Bob Coffey. "The regulators performed even beyond our expectations," according to Webber and Coffey. "Our Pacer Regulators each had a bottom time of 5 hours per day with a total time of 3,000 hours of trouble-free operation for the expedition. And these weren't



sport diving conditions. Our divers were working at sixty foot depths with heavy equipment such as jackhammers, underwater saws and Venturi excavating equipment (huge vacuum cleaners used to suck up sand and coral debris). They were literally in an underwater sandstorm much of the time working in underwater mining conditions at high breathing rates. The Pacer delivered the air and the performance our divers needed."

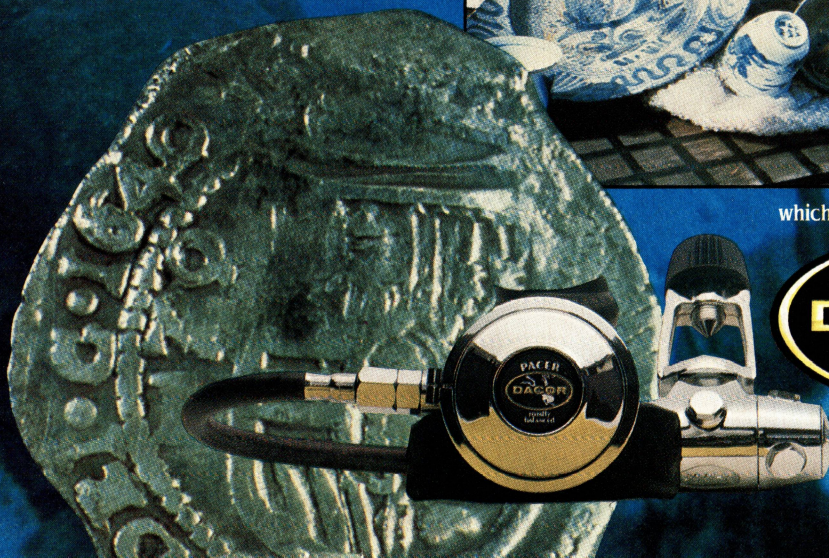
Remember, there is no more valid proof of quality than performance. The Dacor Pacer was put to the test by the professional crew of treasure hunters who dove the "Concepción". If you want to know

which regulator to buy, just ask the professionals who use the Pacer.



DACOR CORPORATION
161 Northfield Road
Northfield, IL 60093
P.O. Box 157

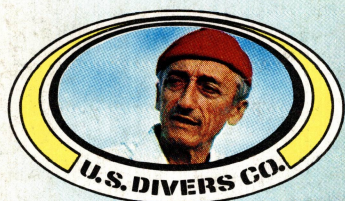
Send \$2.00 for Dacor Divers Kit. Includes catalog, cloth patch, decomp. table, decals.



A Perfect 10

Coordinate your fun in comfort and style, and dive with the versatility of the Sea Otter. Unique in function, the Sea Otter offers you the best in dive control. Our one hand inflate/deflate design gives you push button response. Equipped with a quick-release cam action pac, Sea Otter diving will help you create the ultimate diving experience.

Take a Sea Otter dive at your local Aqua-Lung® Dealer today.



Jacques-Yves Cousteau,
Chairman of the Board



U.S. DIVERS

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